United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
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Las Vegas, NV 89114

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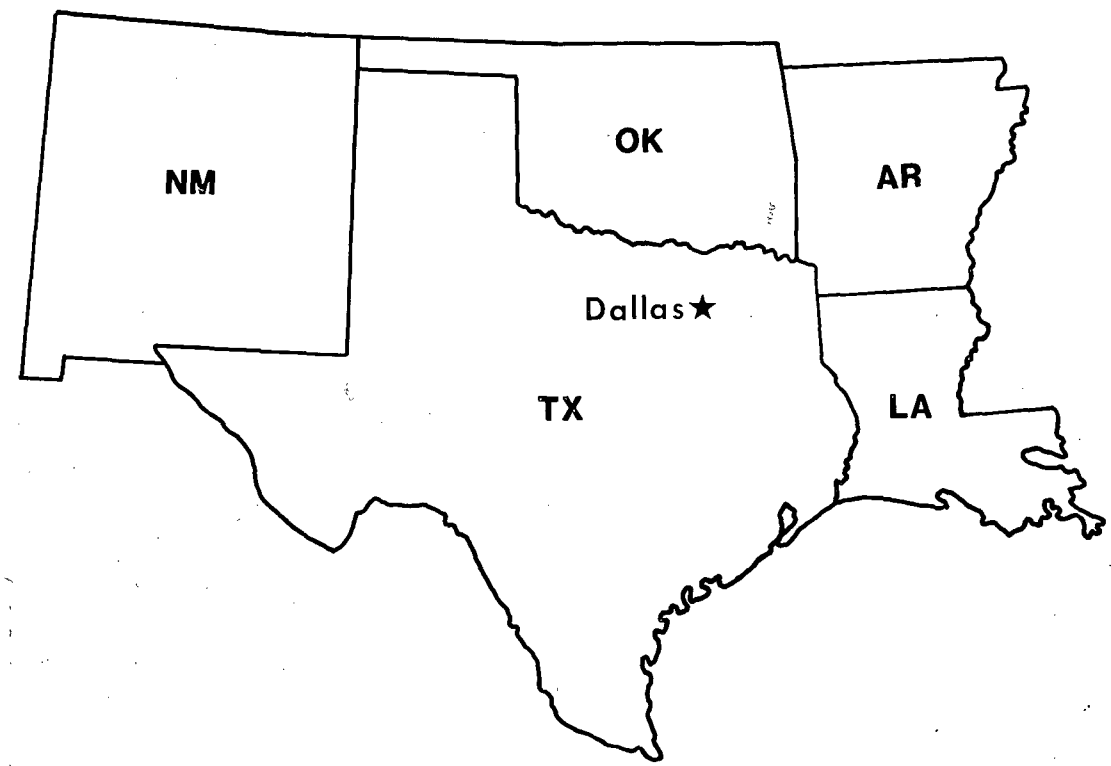
December 1982

Research and Development

EPA

AERIAL PHOTOGRAPHIC ANALYSIS OF HAZARDOUS WASTE STUDY SITES New Mexico and Texas

Region VI



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AERIAL PHOTOGRAPHIC ANALYSIS OF HAZARDOUS WASTE SITES

New Mexico and Texas

by

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ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89114

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ABSTRACT

Intensive and single date analyses of aerial photographs that covered four selected hazardous waste sites within New Mexico and Texas were conducted by the U.S. Environmental Protection Agency. All analyses were performed by the Environmental Monitoring Systems Laboratory, Las Vegas, in support of the Agency's Region VI Environmental Services Division and Office of Emergency and Remedial Response in Washington, D.C. The analyses were performed to assist Region VI in monitoring and assessing site status.

Waste disposal areas were visible at all selected hazardous waste sites. All sites were active as of the spring of 1982.

CONTENTS

FIGURES

(continued)

FIGURES (continued)

INTRODUCTION

Aerial photographs were used to conduct intensive and single date analyses of selected hazardous waste sites within New Mexico and Texas. The analyses were performed by the Environmental Protection Agency's (EPA) Environmental Monitoring Systems Laboratory, Las Vegas, at the request of the EPA's Region VI Environmental Services Division and Office of Emergency and Remedial Response in Washington, D.C. This report, the second of three, contains the analyses of four hazardous waste sites located at Hurley, New Mexico; Questa, New Mexico; Rayford and Highlands, Texas (Figures 1 through 4). The first and third reports contain the analyses of selected hazardous waste sites in Arkansas, Oklahoma, and Louisiana. All analyses presented in the three reports were conducted in order to assist Region VI in monitoring hazardous waste sites in that Region and to provide photographic support for possible regulatory actions under the Resources Conservation and Recovery Act.

STUDY AREA LOCATION

FIGURE 1

FIGURE 2

STUDY AREA LOCATION

STUDY AREA LOCATION

FIGURE 3

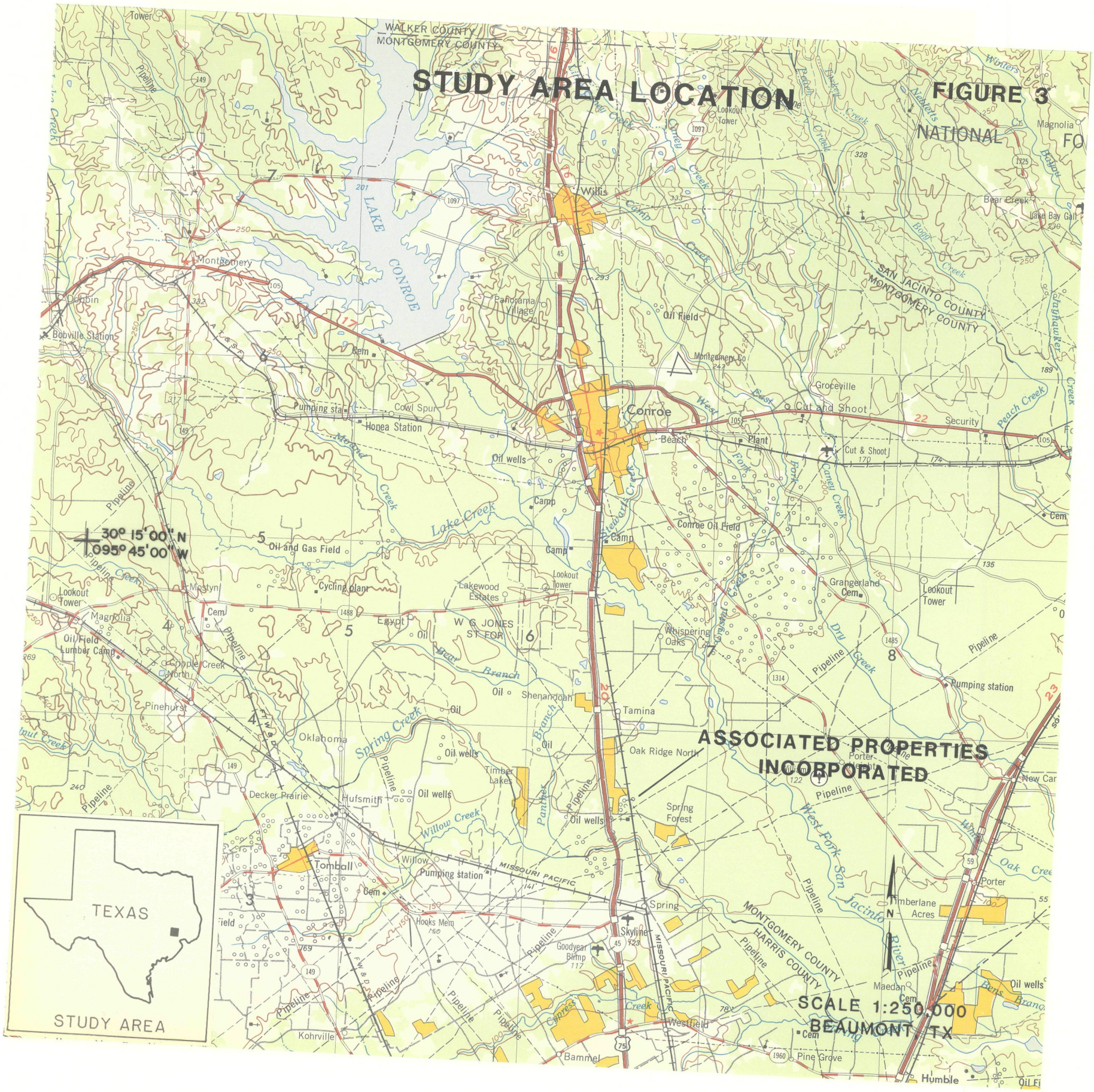


FIGURE 4


STUDY AREA LOCATION
JOHNSON ACID PITS
29°45'00" N
095°00'00" W
SCALE 1:250,000
HOUSTON, TX
TEXAS
STUDY AREA
Houston Intcntl
Humble
Parkwood Estates
Kinwood
Oil Field
Dyersdale
Mi Houston
Windmill
Victor
Garners Bayou
Williams Gully
Houston Lake
Gum Gully
San Jacinto Dam
Crosby
Rawe
Flying F
Sheeks
Rice
Gum Island
Dayton Canal
4H Lake
Demijohn Lake
Moss Bluff
Big Cane Cr
Old River
Barbers Hill Canal
Cedar Bayou
Magnolia Gardens
Plant WT
Cem
Barrett
Sheldon
Oil pumping sta
Sheldon Res
Houmont Park
Fauna
Water tr
Skyhaven
Golf course
Faucet Lake
Harris County Canal
Pumping station
Winfree
LIBERTY
CHAMBERS
Lost Lake
Mont Belvieu
Elevator
Plants
Dawes
Beaumont Place
Bear Lake
Highlands
McNair
Linus
Coady
Water tower
Radio tower
Oates Prairie
Jacinto City
Cloverleaf
Channelview
Humphrey
Cove
Old River Lake
Cotton Lake
Dutton Lake
Galena Park
Monument
Goat Island
Scott Bay
SAN JACINTO BATTLEGROUND ST PK
Substa
Tower
Harrisburg
PASADENA
Deer Park
Factory
Strang
Tabbs Bay
Morgan Point
Light
Shell Point
Cedar Point
Sea Crest Park
Houston Point
Optimist Camp
TRINITY
South Houston
Golden Acres
La Porte
Atkinson Island
Bayside Terrace
Shoreacres
Red Bluff
El Jardin Del Mar
Hobby
East Haven
Genoa
Minnetex
Mykawa
ELLINGTON AFB
Oil field
Water tower
Pump
Seabrook
Todville
Kemah
OIL FIELD
Clear Lake
Clear Lake Shores
LBJ SPACE CENTER (NASA)
Webster
Friendswood
Power plant
League City
Spaceland
Bacliff
Ellis
Pumping sta
Eagle Point
San Leon
Vingt-et-un Islands
Morgan Point
Red Fish Bar
Smith Point
Red Fish Island
Oil wells
Kilkare
Mud
Taylor Lake
Pine Gully
Houston Ship Channel
GALVESTON
HARRIS CO
CHAMBERS CO
GALVESTON CO
BUFFALO BAYOU
SOUTHERN PACIFIC
MISSOURI PACIFIC

METHODOLOGY

Stereoscopic pairs of historical and current aerial photographs are used to perform the intensive and current analyses. Stereo viewing enhances the interpretation effort because it allows the analyst to observe the vertical as well as the horizontal spatial relationships of natural and cultural features. Stereoscopy is also an aid in distinguishing between the various shapes, tones, textures, and colors that can be found within a study area.

Evidence of waste burial and dumping is a prime consideration when conducting a hazardous waste analysis. Burial and dumping of hazardous materials could result in leachate or seepage which often threaten existing surface and groundwater sources. Pools of unexplained liquid are routinely noted because they can be indicative of seepage from buried wastes and may enter drainages that allow them to move offsite. The presence or absence of spills, spill stains, and vegetation damage within a site are excellent indicators of how well hazardous materials are being handled at that site. Trees and other forms of vegetation that exhibit a marked color difference from surrounding species of the same type are labeled "dead" or "stressed" based upon the degree of noticeable variation. Vegetation is so labeled only after a careful consideration of the time of season in which the aerial photographs were acquired.

Drainage analysis is conducted in order to determine the direction that a spill or surface runoff will most likely follow. Direction of drainage is determined from the analyses of the aerial photographs and from U.S. Geological Survey 7.5-minute quadrangle sheets.

Historical and current aerial photographs of the New Mexico and Texas hazardous waste sites were obtained from the sources listed in the following table:

TABLE 1. SOURCES OF ARCHIVAL AND CURRENT PHOTOGRAPHS

Site Name	Site Location	Geographic Coordinates	Date of Photo Acquisition	Photo Source
Molycorp, Incorporated	Questa, NM	36°41.3'N, 105°30.8'W	April 26, 1982	EMSL-LV
Kennecott Corporation	Hurley, NM	32°41.1'N, 108°06.9'W	May 24, 1982	EMSL-LV
Associated Properties, Incorporated	Rayford, TX	30°08.3'N, 095°25.7'W	October 15, 1952	ASCS
			November 21, 1958	ASCS
			November 20, 1968	ASCS
			May 10, 1982	EMSL-LV
Johnson Acid Pits	Highlands, TX	29°48.6'N, 095°04.6'W	January 30, 1939	NARS
			April 11, 1944	ASCS
			March 25, 1953	ASCS
			March 26, 1957	ASCS
			October 8, 1964	ASCS
			October 16, 1966	EROS
			August 23, 1973	NASA
			May 10, 1982	EMSL-LV

Photo source identification:

(ASCS) U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service
(EMSL-LV) U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Las Vegas
(EROS) U.S. Department of the Interior, Earth Resources Observation System
(NARS) National Archives and Records Service
(NASA) National Aeronautics and Space Administration

Prints made from all data sets are included within this report. The scales of these prints range between 1:4,000 (1 inch equals 333 feet) and 1:9,800 (1 inch equals 817 feet). All photographs are free of clouds and cloud shadows, and are of the best quality obtainable. Study area locations are portrayed on the Raton, New Mexico, Silver City, New Mexico; Beaumont, Texas; and Houston, Texas, 1:250,000 topographic map sheets (Figure 1 through 4). Site locations are portrayed on the Questa, Hurley East, Tamina, and Highlands 7.5-minute topographic quadrangles (Figures 5, 13, 14, 29, and 34).

MOLYCORP, INCORPORATED

PHOTO ANALYSIS

April 26, 1982, Photograph

This site is a molybdenum surface mine and mill operation located in the Sangre de Cristo Mountains of northern New Mexico, approximately 14 kilometers (9 miles) east of Questa (Figure 5). The major drainages that are present within the area are Sulphur Gulch, Spring Gulch, and Goathill Gulch. Only Goathill Gulch appears to have maintained its connection with the Red River, as the other drainages have been interrupted by the mining operation.

Site operations are primarily conducted within the open pit and mill areas, both of which are located at Sulphur Gulch (Figures 7 and 10). Ore concentration is being conducted within the mill area and several tanks that are associated with this process are present. No problems appear to exist within the area at this time. Additional site operations are conducted within several yard areas noted in the vicinity of Goathill Gulch (Figures 6, 8, 9, and 11). The remainder of the site is characterized by mass wasting and the presence of overburden that is usually associated with surface mining.

Spillages are visible throughout the site, most notably in the vicinity of storage and processing tanks (Figures 7 through 12). None appear to threaten existing site drainages.

Onsite waste disposal facilities include open dumps visible in the vicinity of Sulphur and Spring Gulches (Figure 7) and a disposal trench that is located near the truck shop (Figure 9). Additional disposal areas include an aeration pond, three empty waste ponds and an open disposal pit that are all located in the vicinity of Goathill Gulch (Figures 8 and 11). None of these disposal facilities appeared to present a threat to site drainages or the Red River at the time that these photographs were acquired.

The potentially most hazardous threat to the Red River may be the situation of pipelines at or near the riverbank. The site's pipelines reportedly transport mill tailings and slurry to waste ponds that are located west of the town of Questa, a distance of approximately 9 miles. An extensive pipeline network is found within the site, but only those pipelines that are located near the Red River have been annotated. A pipeline crosses the Red River near one of the yard areas (Figures 8 and 9). A second pipeline enters an open pit near the river's edge (Figure 12) and may discharge into the river. Pipeline breaks and/or the direct discharge of their contents into the Red River are the most likely sources of contamination to this water resource.

FIGURE 5

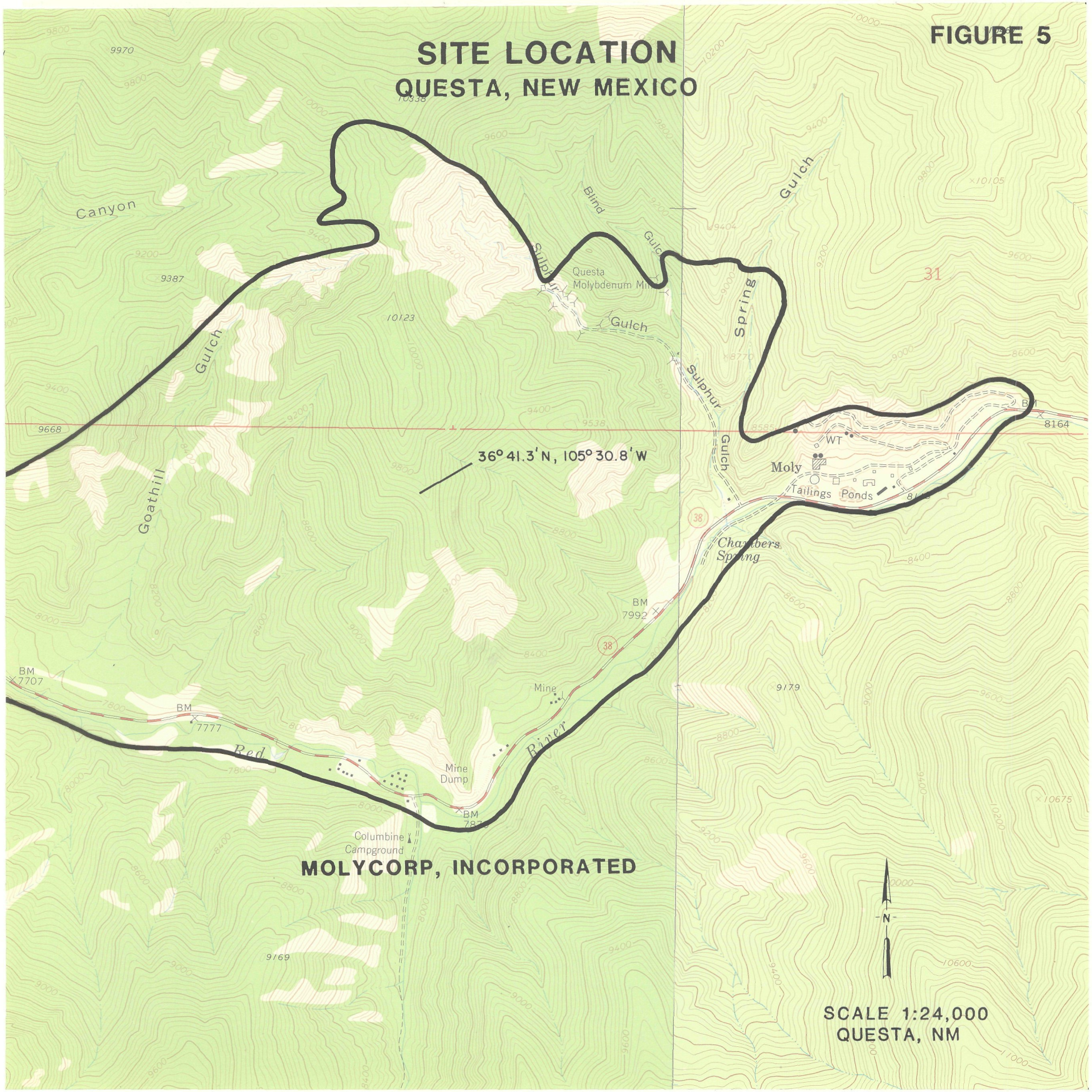
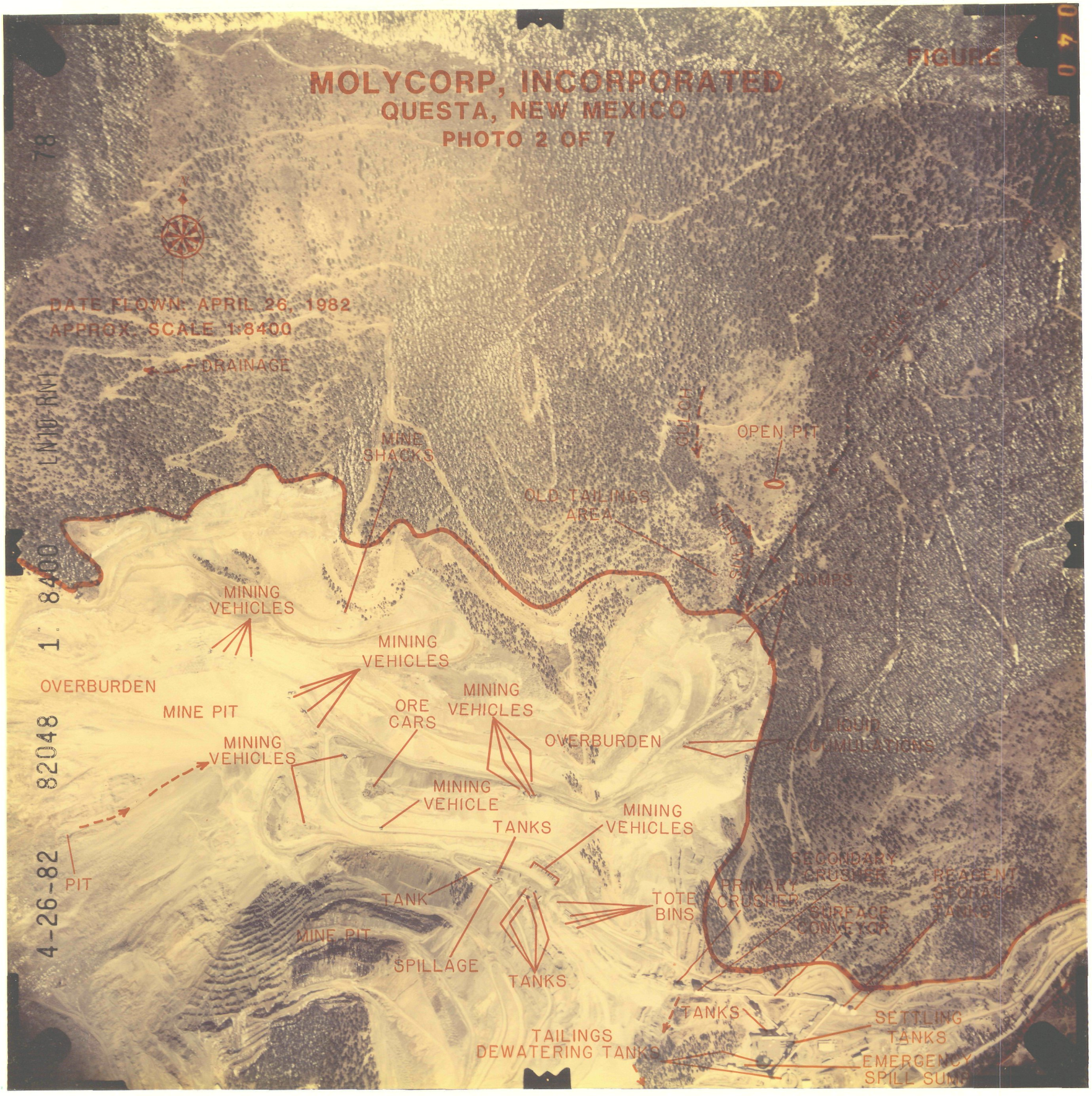
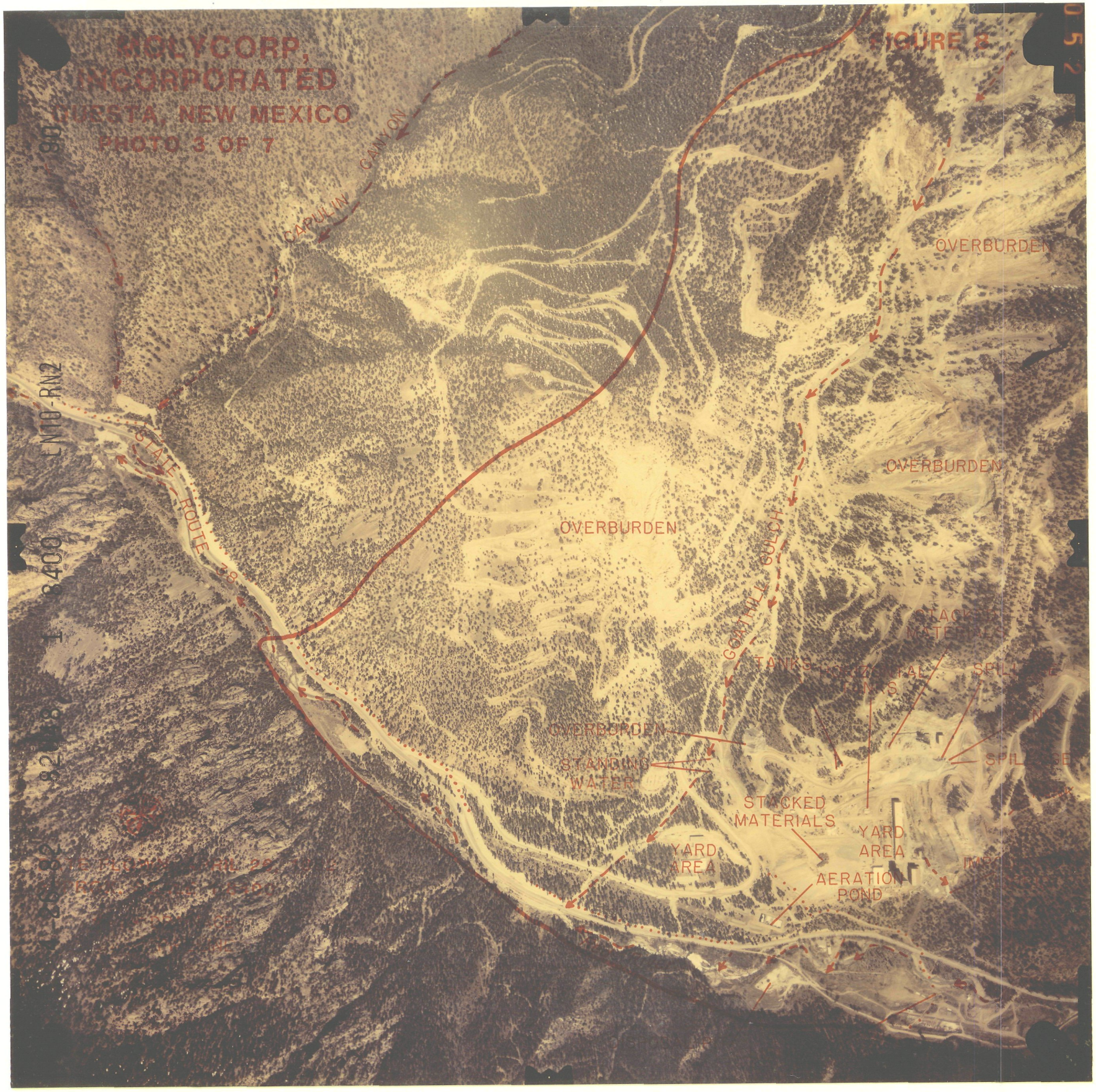

SITE LOCATION
QUESTA, NEW MEXICO
36° 41.3' N, 105° 30.8' W
Canyon
Goathill
Gulch
Blind
Gulch
Sulphur
Gulch
Questa
Molybdenum Mine
Spring
Gulch
Sulphur
Gulch
Moly
Tailings Ponds
WT
BM
8164
Chambers
Spring
BM
7992
38
BM
7707
BM
7777
Red
River
Mine
Mine
Dump
BM
Columbine
Campground
MOLYCORP, INCORPORATED
9970
9387
10123
9668
9538
9769
9179
31
N
SCALE 1:24,000
QUESTA, NM

FIGURE 4


MOLYCORP, INCORPORATED
QUESTA, NEW MEXICO
PHOTO 2 OF 7
DATE FLOWN: APRIL 26, 1982
APPROX. SCALE 1:8400
DRAINAGE
MINE SHACKS
OLD TAILINGS AREA
OPEN PIT
DUMPS
MINING VEHICLES
OVERBURDEN
MINE PIT
ORE CARS
MINING VEHICLES
MINING VEHICLES
MINING VEHICLES
OVERBURDEN
MINING VEHICLE
TANKS
MINING VEHICLES
PIT
TANK
MINE PIT
SPILLAGE
TANKS
TOTE BINS
PRIMARY CRUSHER
SECONDARY CRUSHER
SURFACE CONVEYOR
TANKS
TAILINGS DEWATERING TANKS
SETTLING TANKS
EMERGENCY SPILL SUMP
8400
82048
4-26-82


MOLYCORP, INCORPORATED
QUESTA, NEW MEXICO
PHOTO 3 OF 7
FIGURE 8
CAPULIN CANYON
OVERBURDEN
OVERBURDEN
OVERBURDEN
GOATHILL GULCH
TANKS
STANDING WATER
STACKED MATERIALS
YARD AREA
YARD AREA
AERATION POND
STATE ROUTE 38
T 8400
T 8200


MOLYCORP, INCORPORATED
QUESTA, NEW MEXICO
PHOTO 4 OF 7
MINING VEHICLES
ORE CARS
MINING VEHICLES
MINING VEHICLES
MINING VEHICLES
TANKS
MINE PIT
PIT
MINE PIT
TANK
SPILLAGE
TANKS
TOTE BINS
OVERBURDEN
TANKS
TIRES
TRUCK SHOP
SPILLAGE
MINING VEHICLES
MINING VEHICLES
SPILLAGE
SOLID WASTE DISPOSAL TRENCH
PIT
OVERBURDEN
OVERBURDEN
OVERBURDEN
GOAT HILL
GUSH
LN10 BM2
8200
8400
TANKS
SPILLAGE
HORIZONTAL TANKS
TANK
SEEPAGE
YARD AREA
WASTE POND
Red River
STATE ROUTE 38
4-26-82


DUMPS
ORE CARS
MINING VEHICLES
LIQUID ACCUMULATIONS
MOLYCORP, INCORPORATED
QUESTA, NEW MEXICO
PHOTO 5 OF 7
MINING VEHICLES
OVERBURDEN
TANKS
MINING VEHICLES
LIQUID ACCUMULATION
TOTE BINS
PRIMARY CRUSHER
SPILLAGE
TANKS
SECONDARY CRUSHER
SURFACE CONVEYOR
STACKED MATERIALS
STACKED MATERIALS
REAGENT STORAGE TANKS
TANKS
STACKED MATERIALS
OVERBURDEN
GULCH
EMERGENCY SPILL SUMP
SETTLING TANKS
SULPHUR
Red Riv
STATE ROUTE 38
LN10-RN2
86
82048 1. 8400
4-26-82
U48

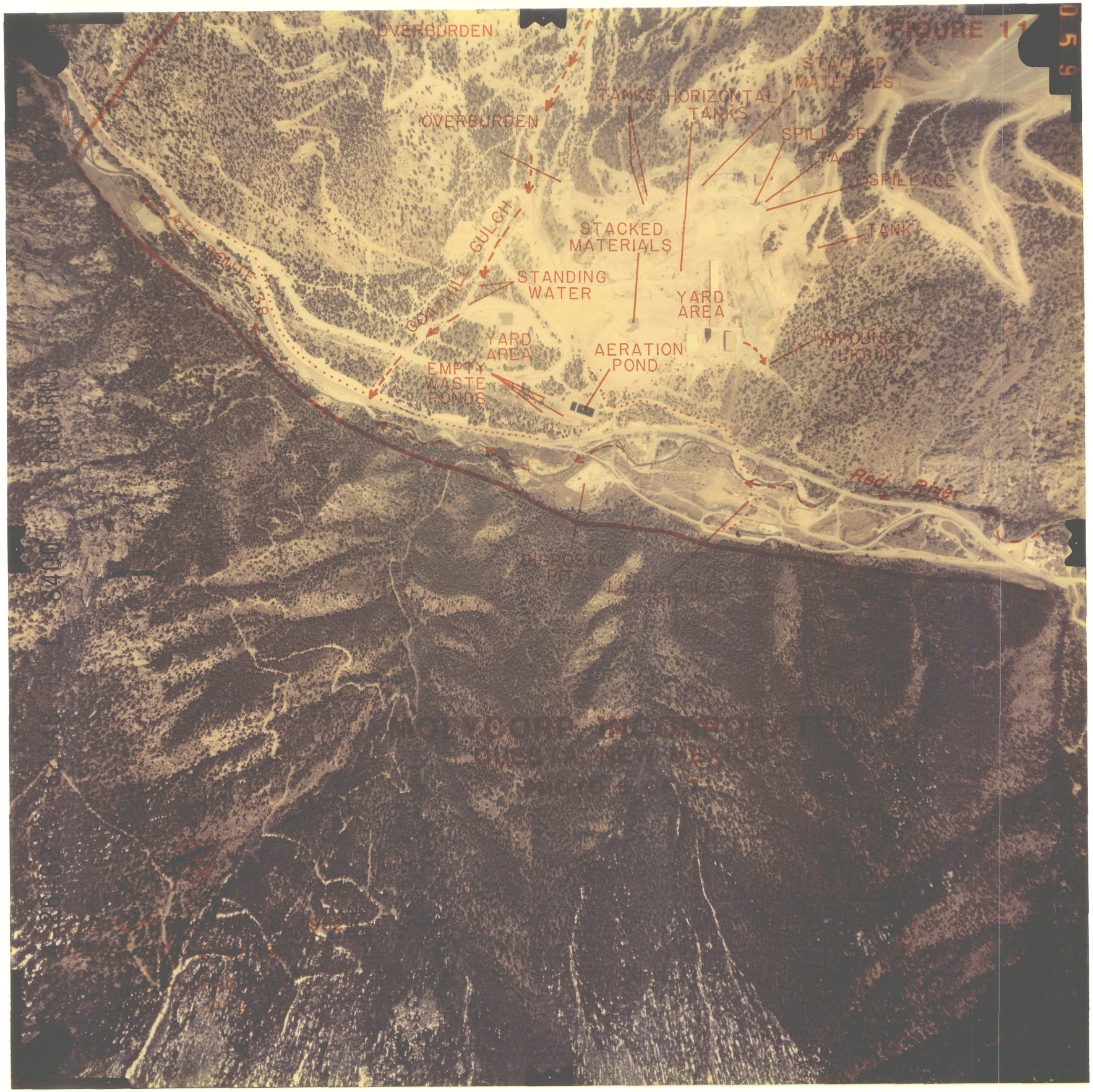


FIGURE 11
OVERBURDEN
OVERBURDEN
TANKS
HORIZONTAL TANKS
STACKED MATERIALS
SPILLAGE
TANK
SPILLAGE
TANK
STACKED MATERIALS
COALHILL GULCH
STANDING WATER
YARD AREA
AERATION POND
EMPTY WASTE PONDS
YARD AREA
IMPOUNDED LIQUID
STATE ROUTE 28
Red River
LAND RM3
84 CO


MOLYCORP, INCORPORATED
QUESTA, NEW MEXICO
PHOTO 7 OF 7
OVERBURDEN
SEEPAGE
PIPELINE DISAPPEARS INTO PIT
STATE ROUTE 38
Red River
DATE FLOWN: APR
APPROX. SCALE 1:0400
TRAVERSE
95
8400
0 5 7

KENNECOTT CORPORATION

PHOTO ANALYSIS

May 24, 1982, Photograph

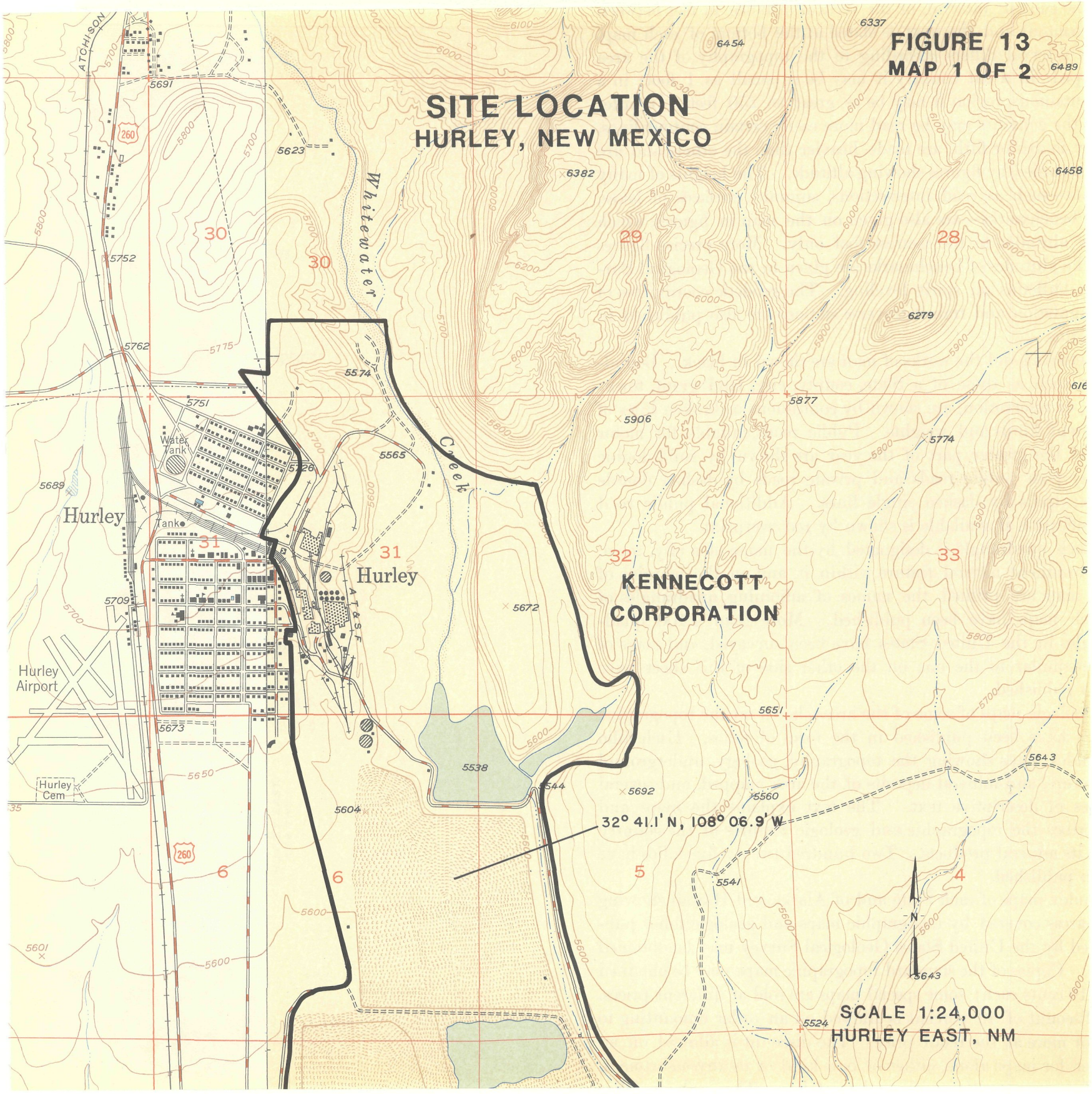
This site is an ore concentration and copper smelting plant that is located at Hurley, New Mexico (Figures 13 and 14). Numerous processing and storage tanks are present within the site, but most appear to be well contained. Two breaches are noted within the berm wall of a containment that surrounds a large storage tank (Figures 15, 19, and 20). Escaping liquid drains towards Whitewater Creek. Approximately 350 stacked drums are also noted in the concentration and smelting area (Figure 16). A cluster of spent drums are visible near the large tailings dewatering tanks (Figures 20 and 21). Seepages from the spent drums are noted.

Wastes are disposed of within open dumps, an open trench, sludge ponds and landfills (Figures 15, 16, 19, 20, and 21). Tailings slurry and liquid wastes from the copper smelter and ore concentration facility are piped into large tailings ponds via aboveground and buried pipelines. Several pipeline leaks are visible, some of which have drained into Whitewater Creek (Figures 15, 19, 22, and 27). Exposed sections of buried pipelines, pipeline sections that are lying within the site, and construction materials suggest that some type of pipeline repair has been undertaken.

Severe rill (water) erosion have created gullies within the berm walls of the tailings ponds. This erosion has allowed tailings and other materials contained within the ponds to flow out of the holding receptacles (Figures 16, 17, 18, 22, 23, 27, and 28). In several instances, this material has entered drainage outlets (Figures 17, 18, 21, 22, 23, 27, and 28).

Discolorations noted within a re-routed portion of Whitewater Creek suggests that the re-routing of the stream has not been entirely effective in protecting the stream (Figure 26). Waste materials noted within Whitewater Creek have been carried into an unnamed drainage outlet (Figures 26 and 27). Dams have been built within the natural Whitewater Creek channel that is located south of the tailings ponds (Figures 27 and 28). Waste liquids that are flowing out of the gullies noted in the berm walls appear to bypass the dams and enter Whitewater Creek.

FIGURE 13
MAP 1 OF 2



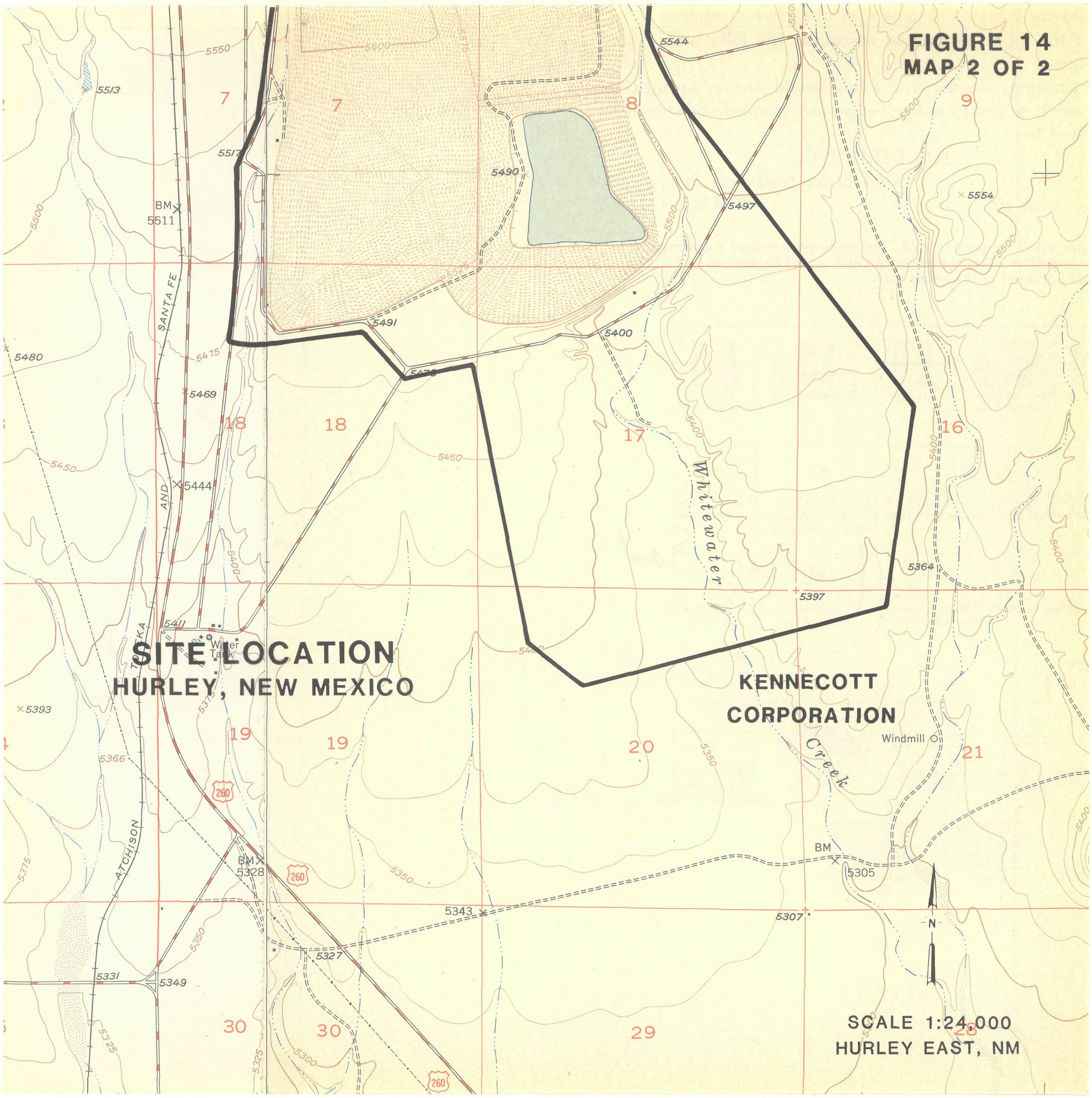


FIGURE 14
MAP 2 OF 2
SITE LOCATION
HURLEY, NEW MEXICO
KENNECOTT
CORPORATION
Whitewater
Creek
Windmill
ATCHISON
TOPEKA
AND
SANTA FE
Water Tank
SCALE 1:24,000
HURLEY EAST, NM

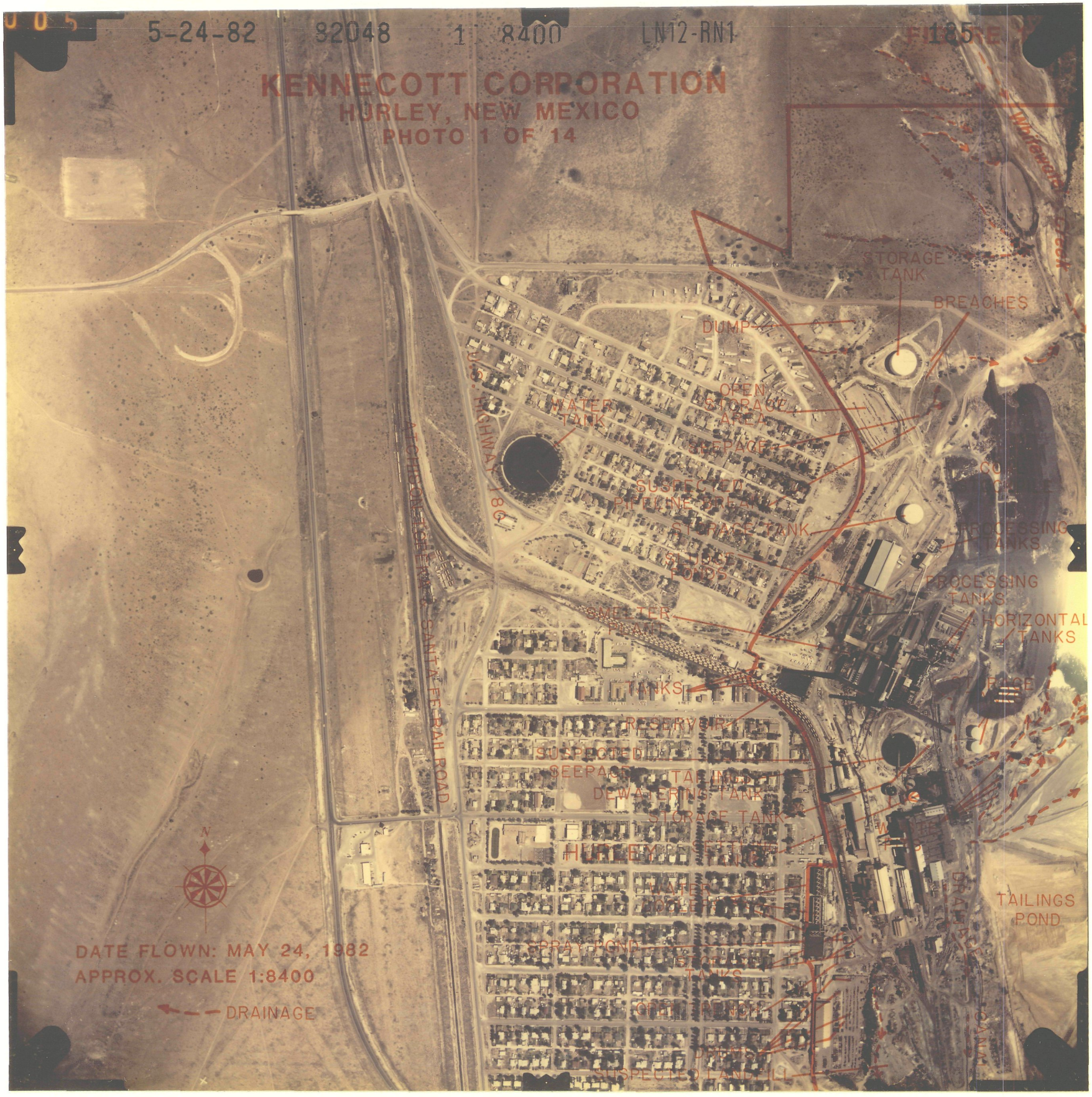

5-24-82 82048 1 8400 LN12-RN1 FI185
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 1 OF 14
Whitewater Creek
STORAGE TANK
BREACHES
DUMP
OPEN STORAGE AREA
WATER TANK
SEEPAGE
SUSPECTED PIPELINE BREAK
U.S. HIGHWAY 180
ATCHISON TOPEKA & SANTA FE RAILROAD
STORAGE TANK
SETTLING PONDS
PROCESSING TANKS
HORIZONTAL TANKS
SMELTER PLANT
TANKS
RESERVOIR
SUSPECTED SEEPAGE
TAILINGS DEWATERING TANK
STORAGE TANK
HURLEY STATION
TAILINGS POND
SPRAY POND
TANKS
SUSPECTED LANDFILL
N
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE

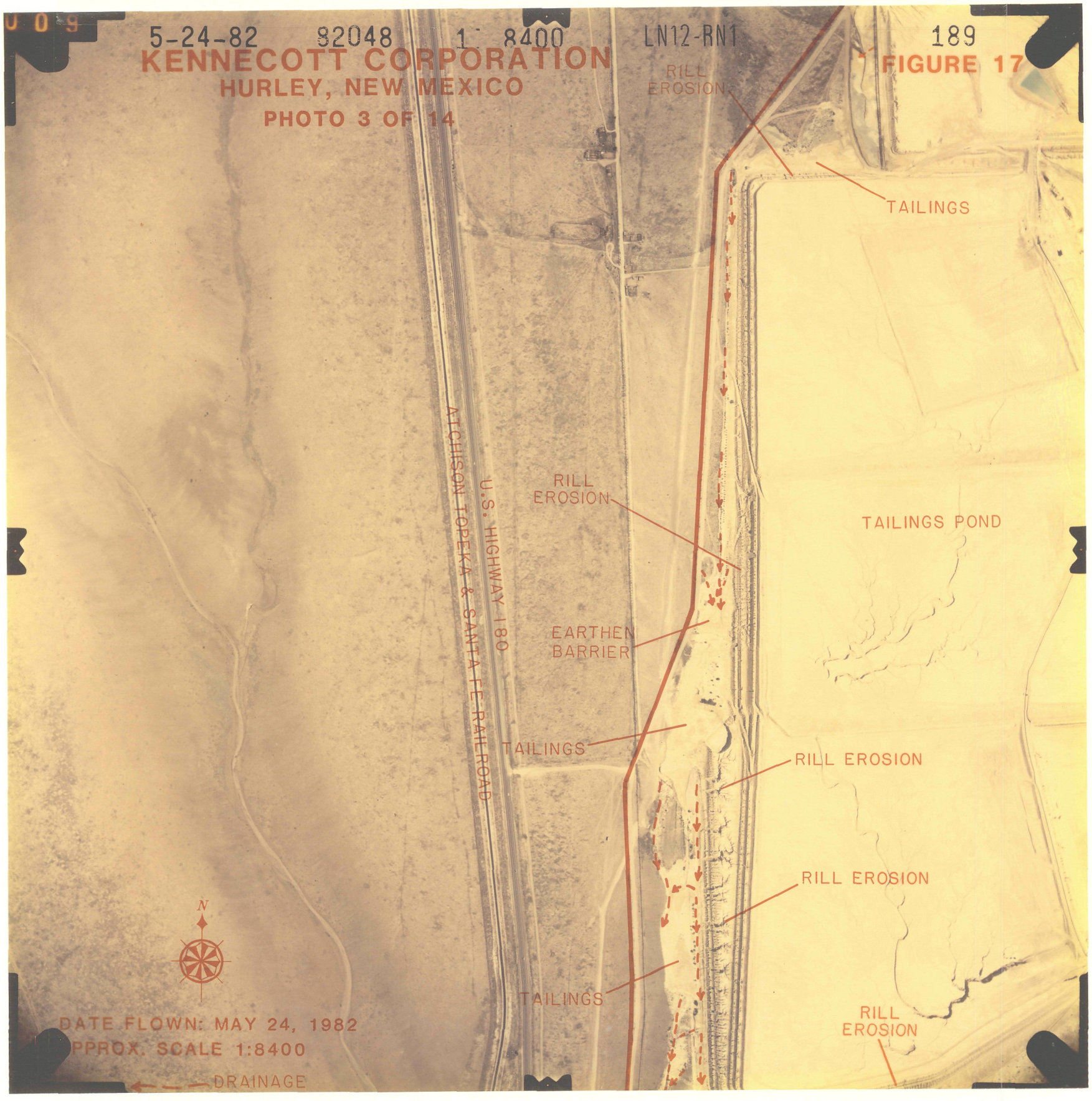
FIGURE 5-24-82 82048 1 8400 T.N12 R.N1

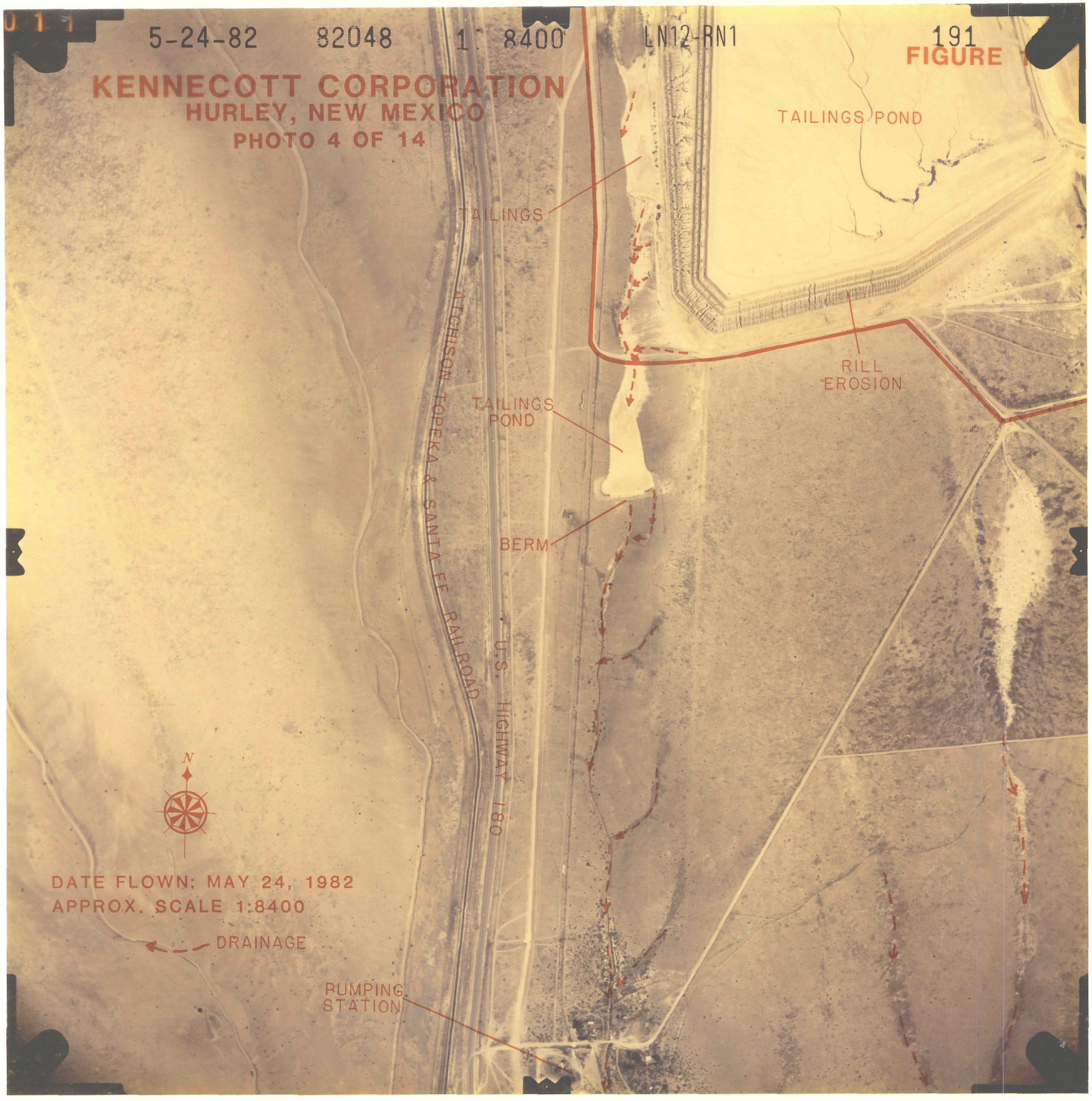
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 2 OF 14

SETTLING PONDS
WATER COOL
SPRAY POND
HURLEY
STORAGE TANKS
OPEN TRENCH
DRUMS
SUSPECTED LANDFILL
TAILINGS POND
CHANNEL
TAILINGS DEWATERING TANKS
TAILINGS
DUMP
TAILINGS
TAILINGS POND
U.S. HIGHWAY 180
ATCHISON TOPEKA & SANTA FE RAILROAD
BREACH IN BERM WALL
TAILINGS POND
RILL EROSION

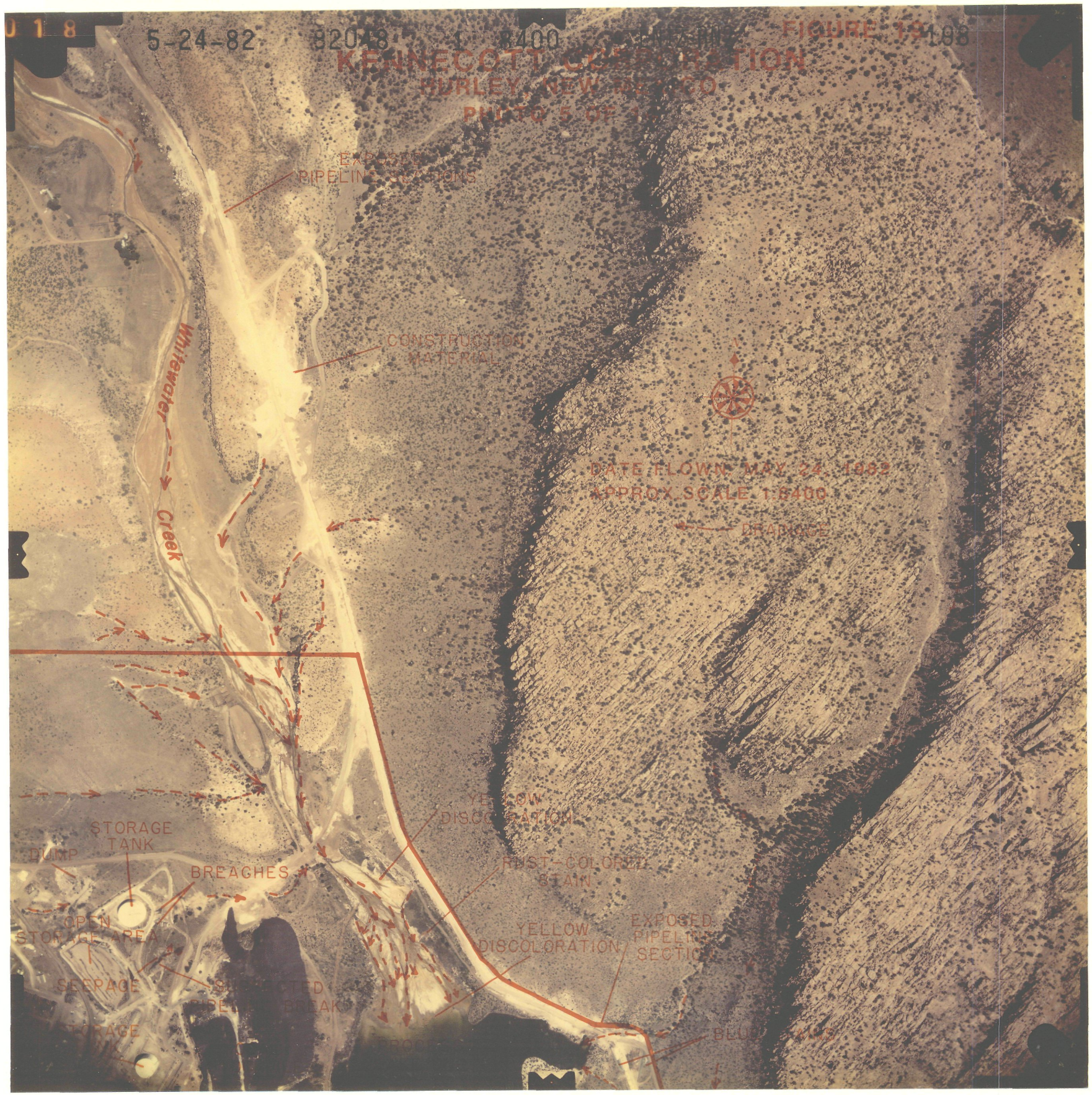
N

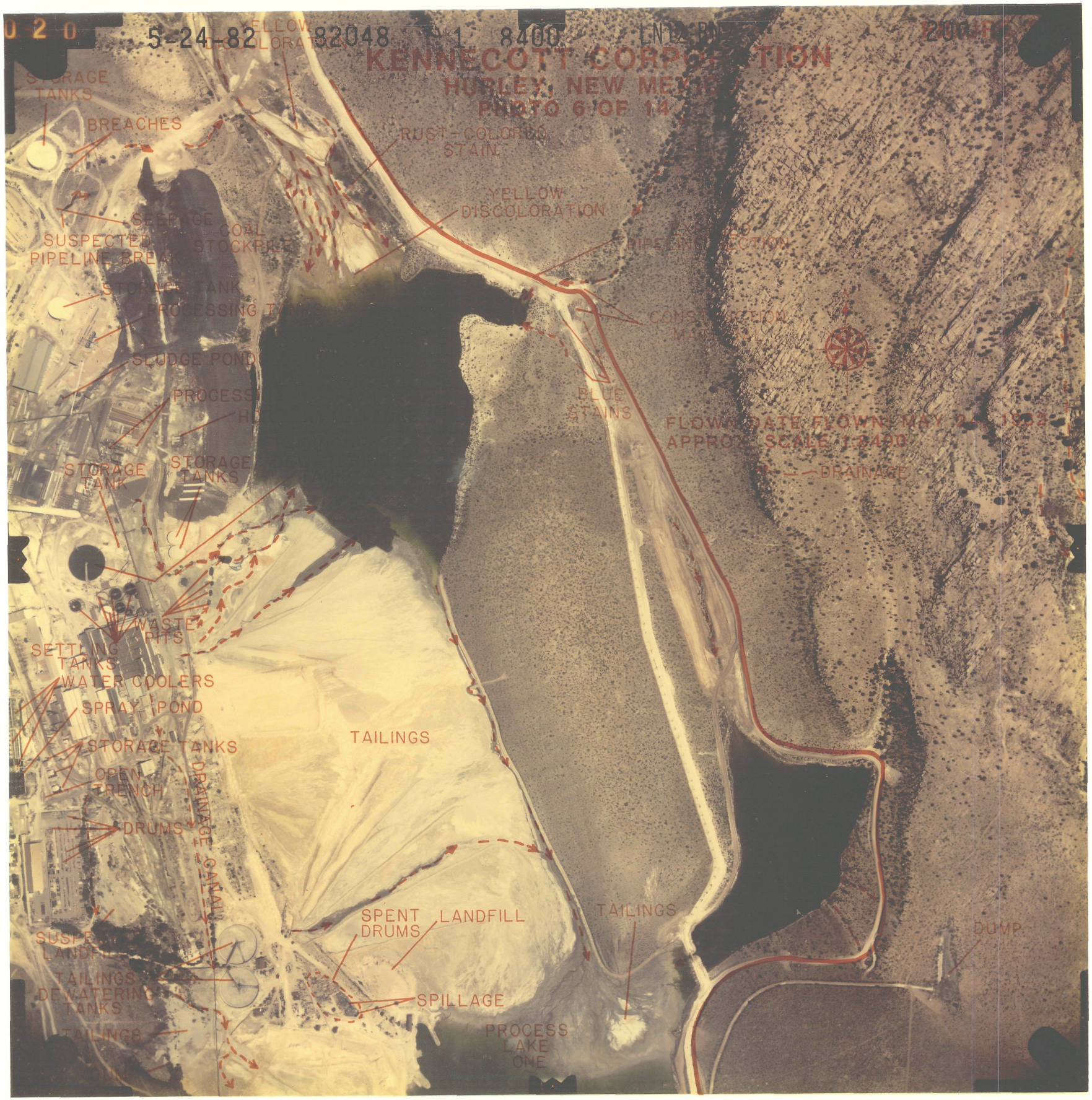
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE

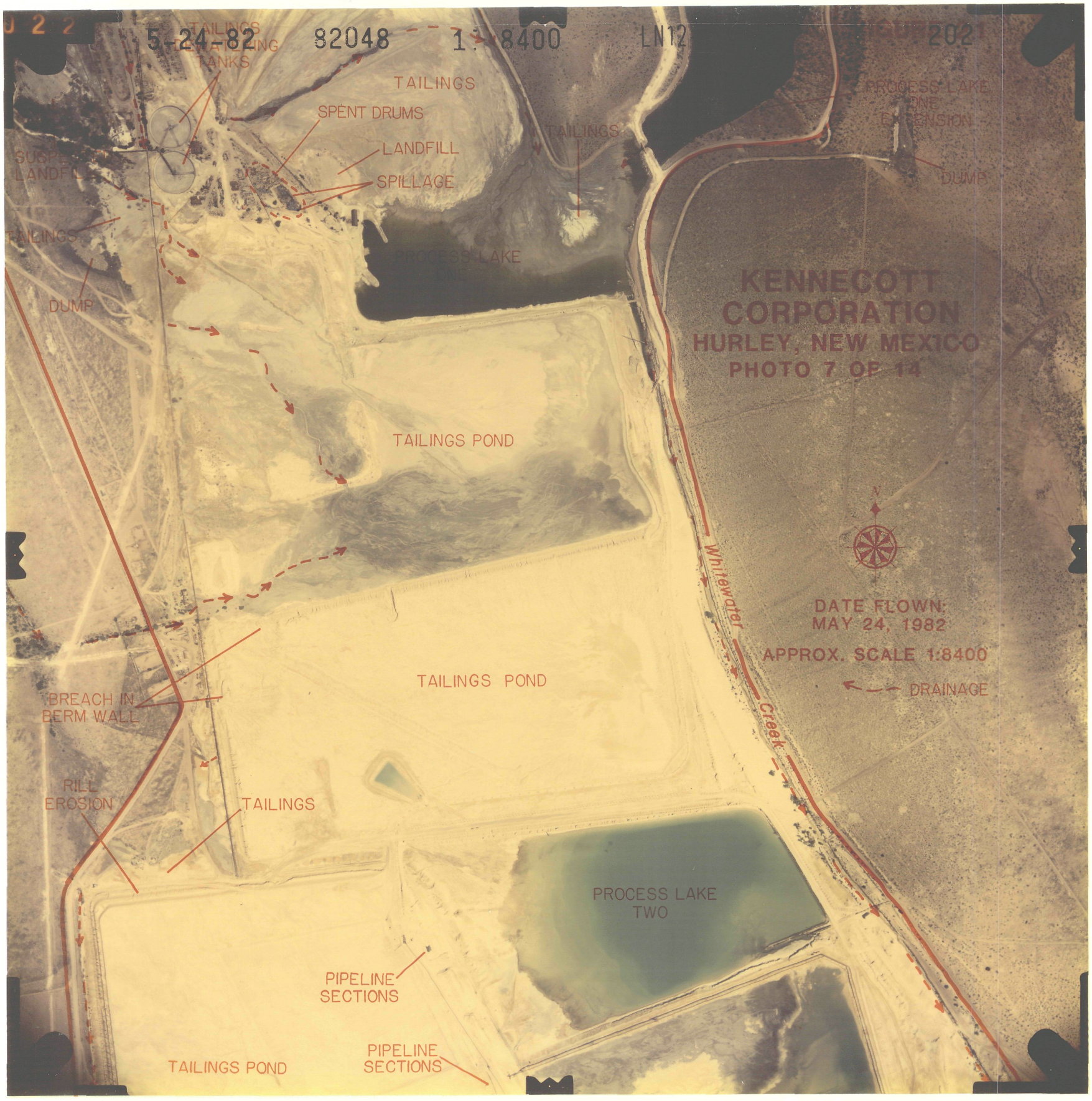

5-24-82 82048 1 8400 LN12-RN1 189
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 3 OF 14
FIGURE 17
RILL EROSION
TAILINGS
RILL EROSION
TAILINGS POND
EARTHEN BARRIER
TAILINGS
RILL EROSION
RILL EROSION
TAILINGS
RILL EROSION
ATCHISON TOPEKA & SANTA FE RAILROAD
U.S. HIGHWAY 180
N
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE

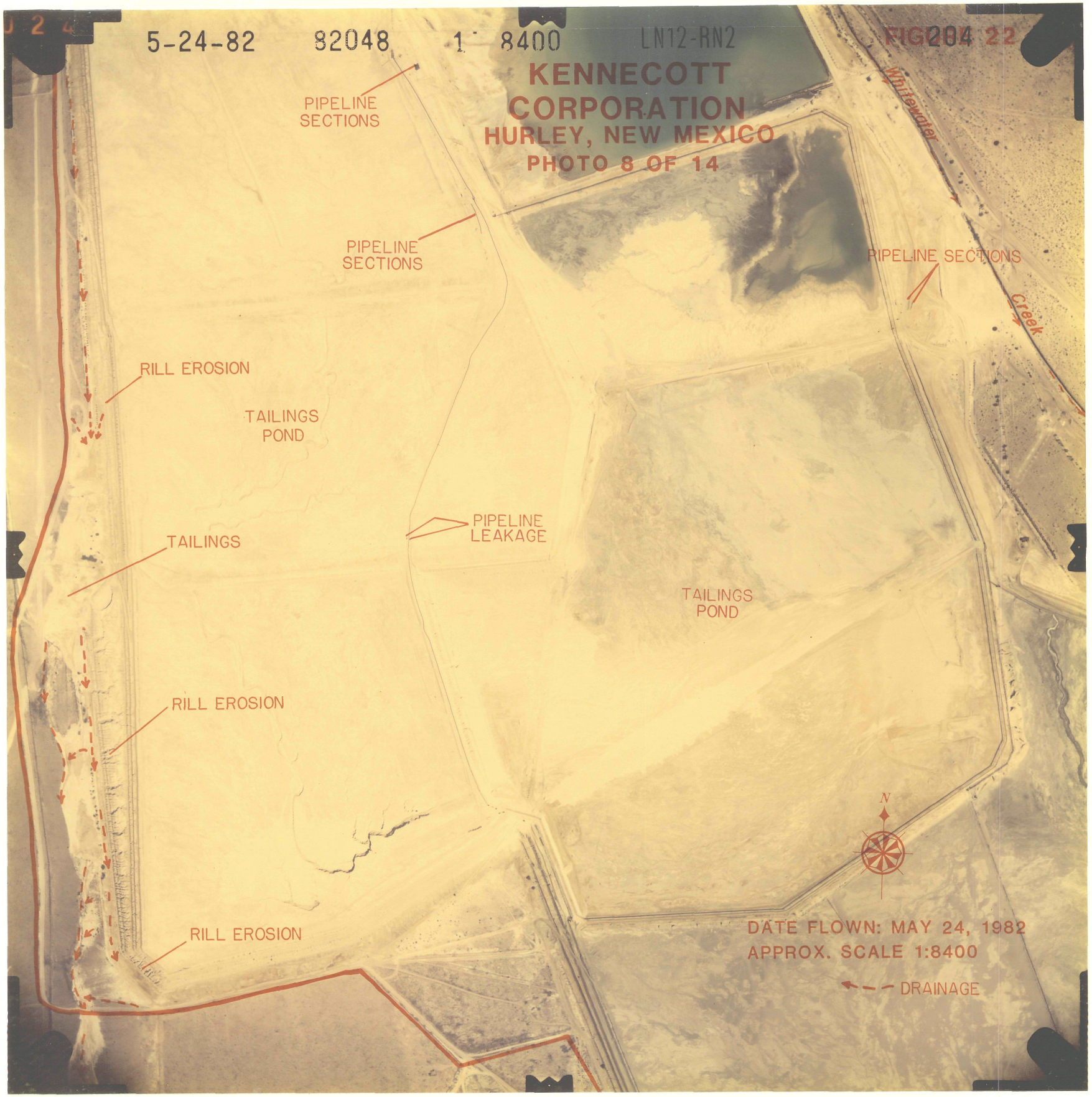

5-24-82 82048 1" 8400 LN12-RN1 191
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 4 OF 14
TAILINGS POND
TAILINGS
RILL EROSION
TAILINGS POND
BERM
ATCHISON TOPEKA & SANTA FE RAILROAD
U.S. HIGHWAY 180
N
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE
PUMPING STATION

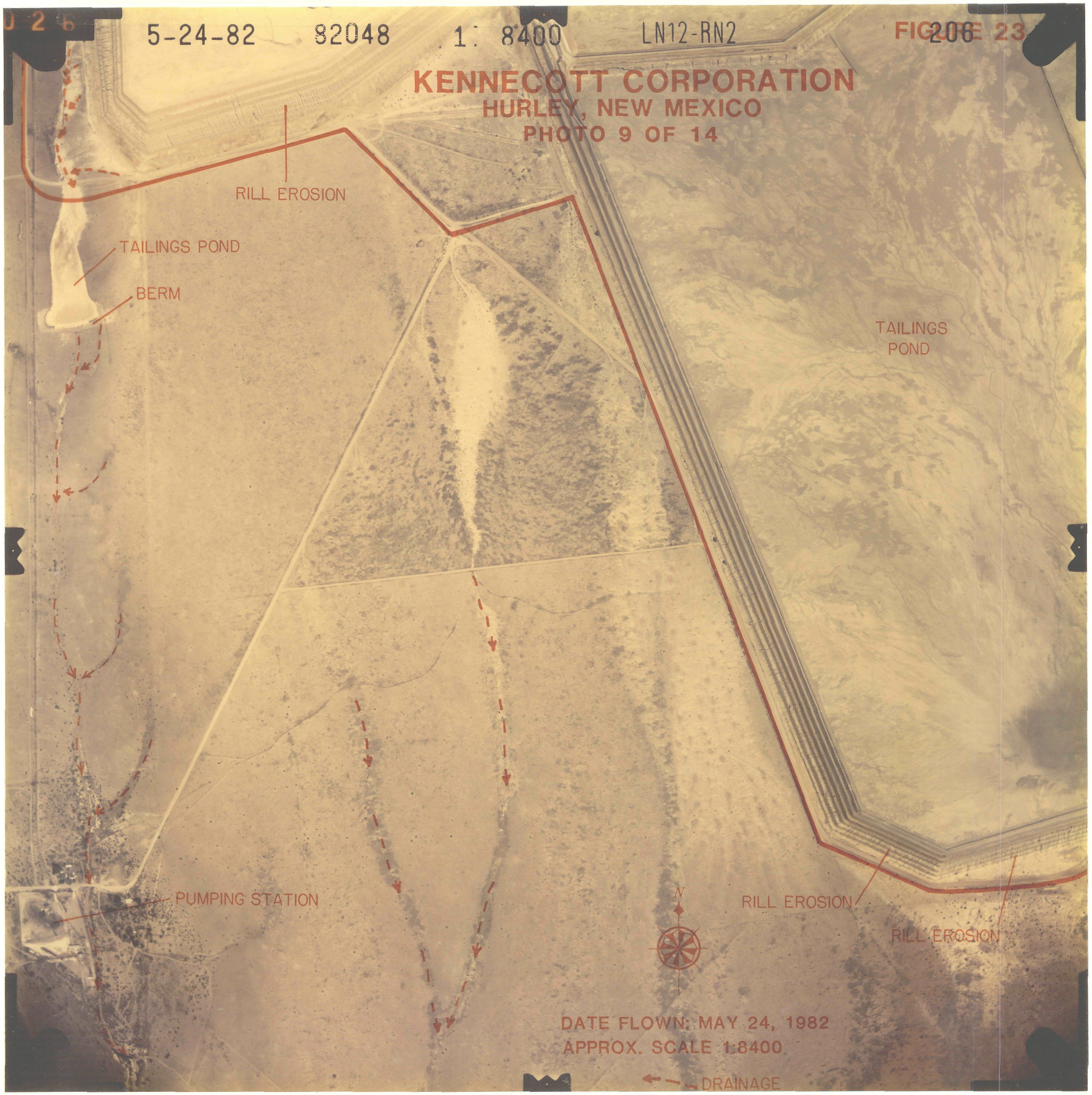
FIGURE

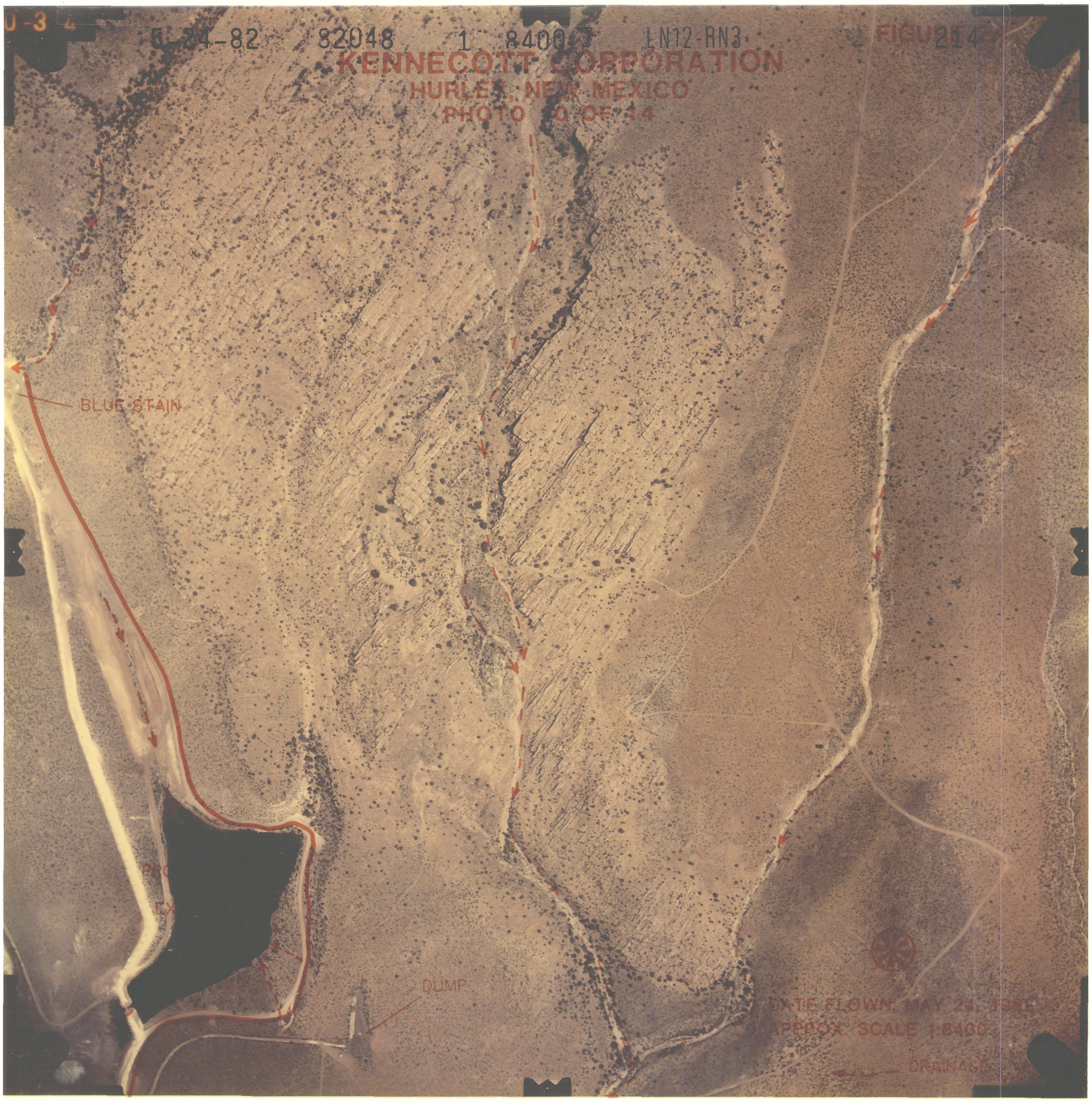

5-24-82
FIGURE 19
KENNECOTT
HURLEY, NEW MEXICO
EXPOSED
PIPELINE SECTIONS
CONSTRUCTION
MATERIAL
Whitewater
Creek
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE
STORAGE
TANK
DUMP
BREACHES
OPEN
STORAGE AREA
SEEPAGE
YELLOW
DISCOLORATION
RUST-COLORED
STAIN
YELLOW
DISCOLORATION
EXPOSED
PIPELINE
SECTION

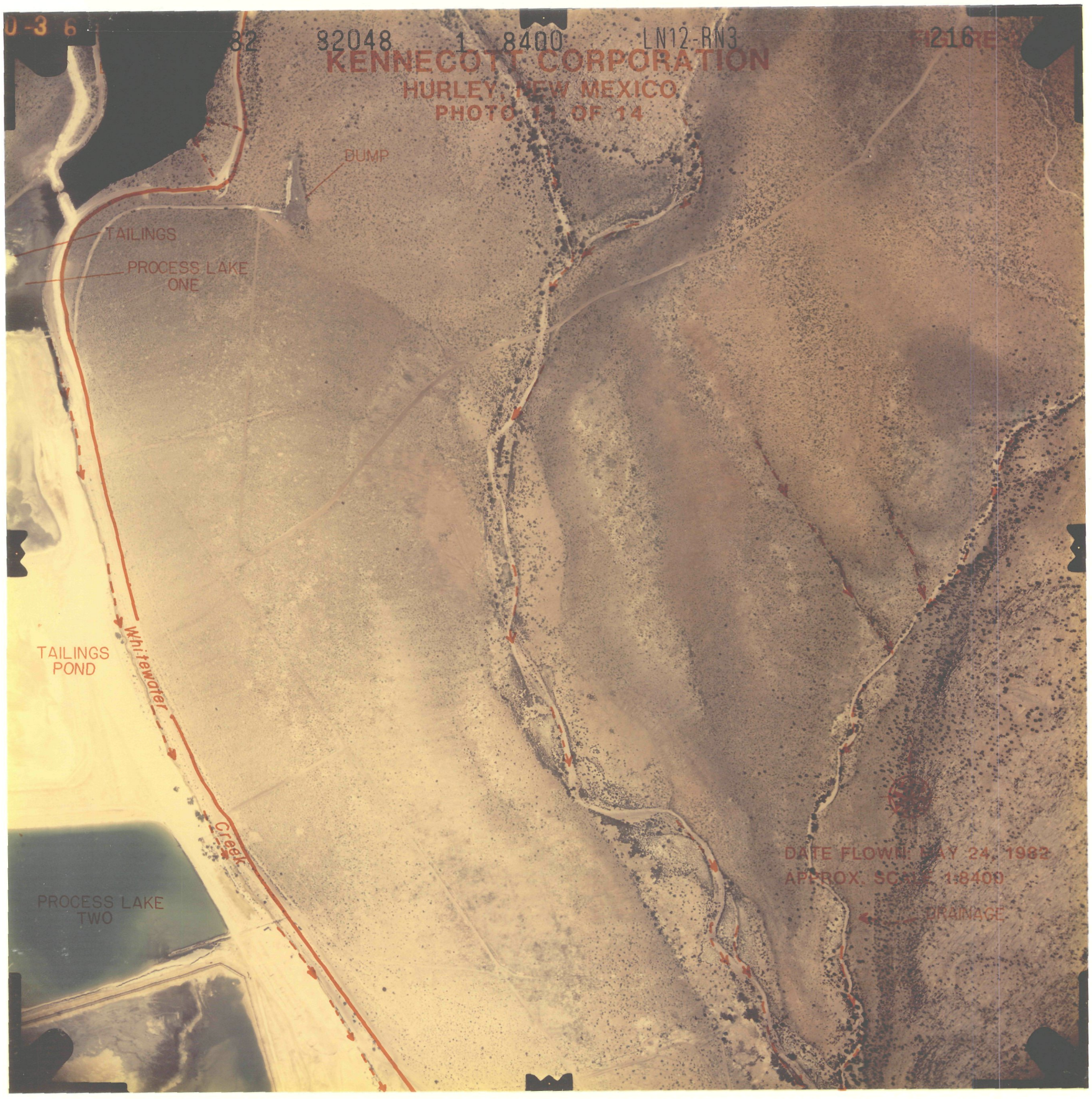

5-24-82 82048
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 6 OF 14
STORAGE TANKS
BREACHES
RUST-COLORED STAIN
YELLOW DISCOLORATION
SEEPAGE
SUSPECTED PIPELINE BREAK
COAL STOCKPILE
STORAGE TANK
PROCESSING TANKS
SLUDGE POND
PROCESS
STORAGE TANK
STORAGE TANKS
BLUE STAINS
FLOW
APPROX. SCALE 1:8400
DRAINAGE
WASTE PITS
SETTLING TANKS
WATER COOLERS
SPRAY POND
STORAGE TANKS
OPEN TRENCH
DRUMS
DRAINAGE CANAL
TAILINGS
SPENT DRUMS
LANDFILL
TAILINGS
DUMP
SUSPECTED LANDFILL
TAILINGS DEWATERING TANKS
TAILINGS
SPILLAGE
PROCESS LAKE ONE

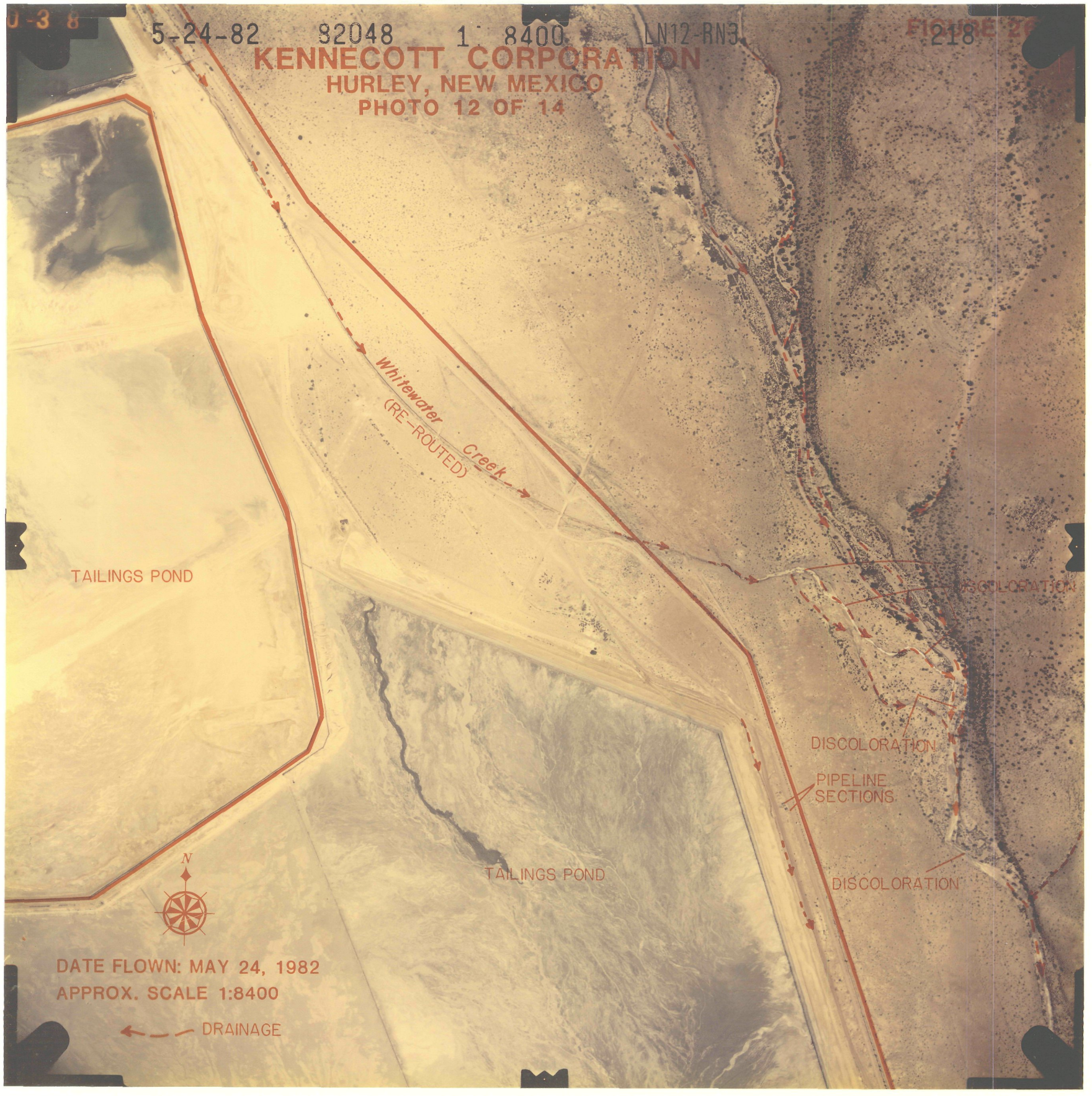

5-24-82
82048
1:8400
LN12
TAILINGS
SPENT DRUMS
LANDFILL
SPILLAGE
TAILINGS
PROCESS LAKE
DUMP
TAILINGS
DUMP
TAILINGS POND
KENNECOTT
CORPORATION
HURLEY, NEW MEXICO
PHOTO 7 OF 14
DATE FLOWN:
MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE
Whitewater
Creek
BREACH IN
BERM WALL
RILL
EROSION
TAILINGS
TAILINGS POND
PROCESS LAKE
TWO
PIPELINE
SECTIONS
TAILINGS POND
PIPELINE
SECTIONS

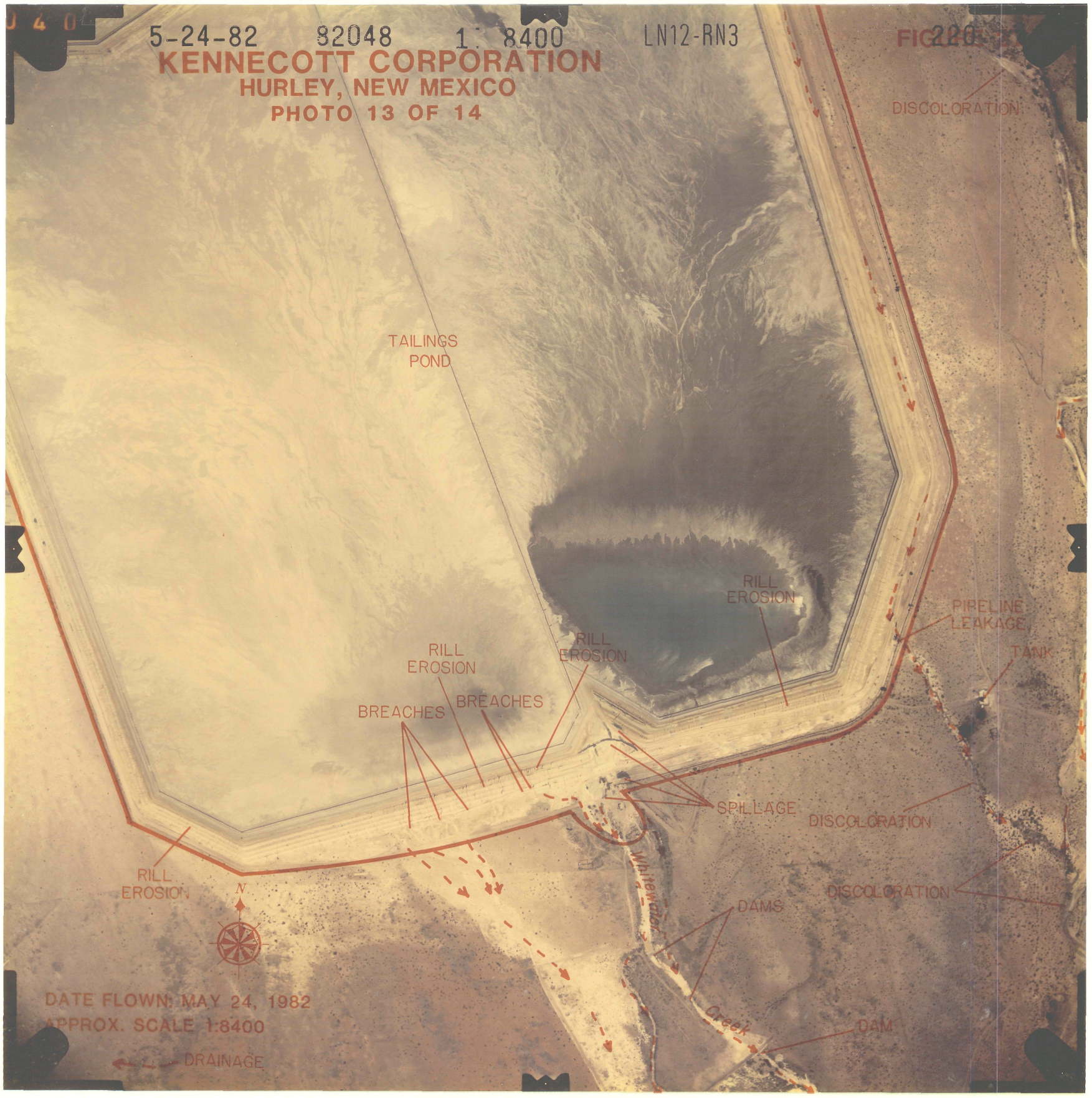

5-24-82 82048 1" 8400 LN12-RN2
FIG204 22
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 8 OF 14
PIPELINE SECTIONS
PIPELINE SECTIONS
PIPELINE SECTIONS
Whitewater Creek
RILL EROSION
TAILINGS POND
TAILINGS
PIPELINE LEAKAGE
TAILINGS POND
RILL EROSION
RILL EROSION
N
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE


5-24-82 82048 1: 8400 LN12-RN2
FIGURE 23
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 9 OF 14
RILL EROSION
TAILINGS POND
BERM
TAILINGS POND
PUMPING STATION
N
RILL EROSION
RILL EROSION
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE


5-24-82 82048 1 8400 LN12-RN3
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
BLUE STAIN
DUMP
DRAINAGE


82 82048 1 8400 LN12-RN3
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 11 OF 14
DUMP
TAILINGS
PROCESS LAKE ONE
TAILINGS POND
Whitewater Creek
PROCESS LAKE TWO
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE


5-24-82 82048 1 8400 LN12-RN3 218
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 12 OF 14
Whitewater Creek
(RE-ROUTED)
TAILINGS POND
DISCOLORATION
DISCOLORATION
PIPELINE SECTIONS
TAILINGS POND
DISCOLORATION
N
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE


5-24-82 82048 1: 8400 LN12-RN3
FIG 220-
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 13 OF 14
DISCOLORATION
TAILINGS POND
RILL EROSION
PIPELINE LEAKAGE
TANK
RILL EROSION
RILL EROSION
BREACHES
BREACHES
SPILLAGE
DISCOLORATION
RILL EROSION
N
Whitewater
DISCOLORATION
DAMS
Creek
DAM
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400
DRAINAGE


5-24-82 82048 1: 8400 LN12-RN3 222
DAMS
DAM
DAM
KENNECOTT CORPORATION
HURLEY, NEW MEXICO
PHOTO 14 OF 14
DATE FLOWN: MAY 24, 1982
APPROX. SCALE 1:8400'

ASSOCIATED PROPERTIES, INCORPORATED

ANALYSIS SUMMARY

The Associated Properties, Incorporated, site is a waste disposal area located at Rayford, Texas within the Rayford Oil Fields (Figure 29). Wastes have been disposed of within piles of excavated material or spoil piles that abut the levee walls of a drainage ditch that flows eastward to the San Jacinto River. Information provided by EPA Region VI indicates that metal drums have occasionally been seen at the site. Waste liquids have also been reported to be oozing from beneath the piles of excavated material. The proximity of the waste disposal site to the drainage ditch makes it likely that contaminants may have entered the ditch.

Photographs depicting the status of the waste disposal area on October 15, 1952, November 21, 1958, November 20, 1968, and May 10, 1982 were used for the analysis of this site (Figures 30 through 33). The Rayford Oil Field was present as early as 1958 (Figure 31), but the waste disposal area and drainage ditch did not appear until 1968 (Figure 32). Disturbed areas were present on the southern bank of the drainage ditch, the largest of which appeared as a landfill. Seepages were visible within the fill material, however, there was no evidence to suggest that contaminants were entering the ditch at that time.

The 1982 photograph (Figure 33) revealed the presence of a levee on both banks of the drainage ditch. Material excavated to form the levee (or spoil) was left adjacent to the levee walls. The waste disposal site appeared to be confined to the spoil area near the Missouri Pacific Railroad.

No drums are apparent on the 1982 photograph, however, deposits of tar and a milky gray substance were noted. Stains are also present upon a berm wall, but no connection can be made between these stains and an adjacent spoil area. There is

no evidence of sheen or contaminants within the ditch although there are sufficient drainage outlets to the ditch to allow contamination to occur. Vegetation damage is visible at the disposal site and in areas to the south.

FIGURE 29

SITE LOCATION
RAYFORD, TEXAS

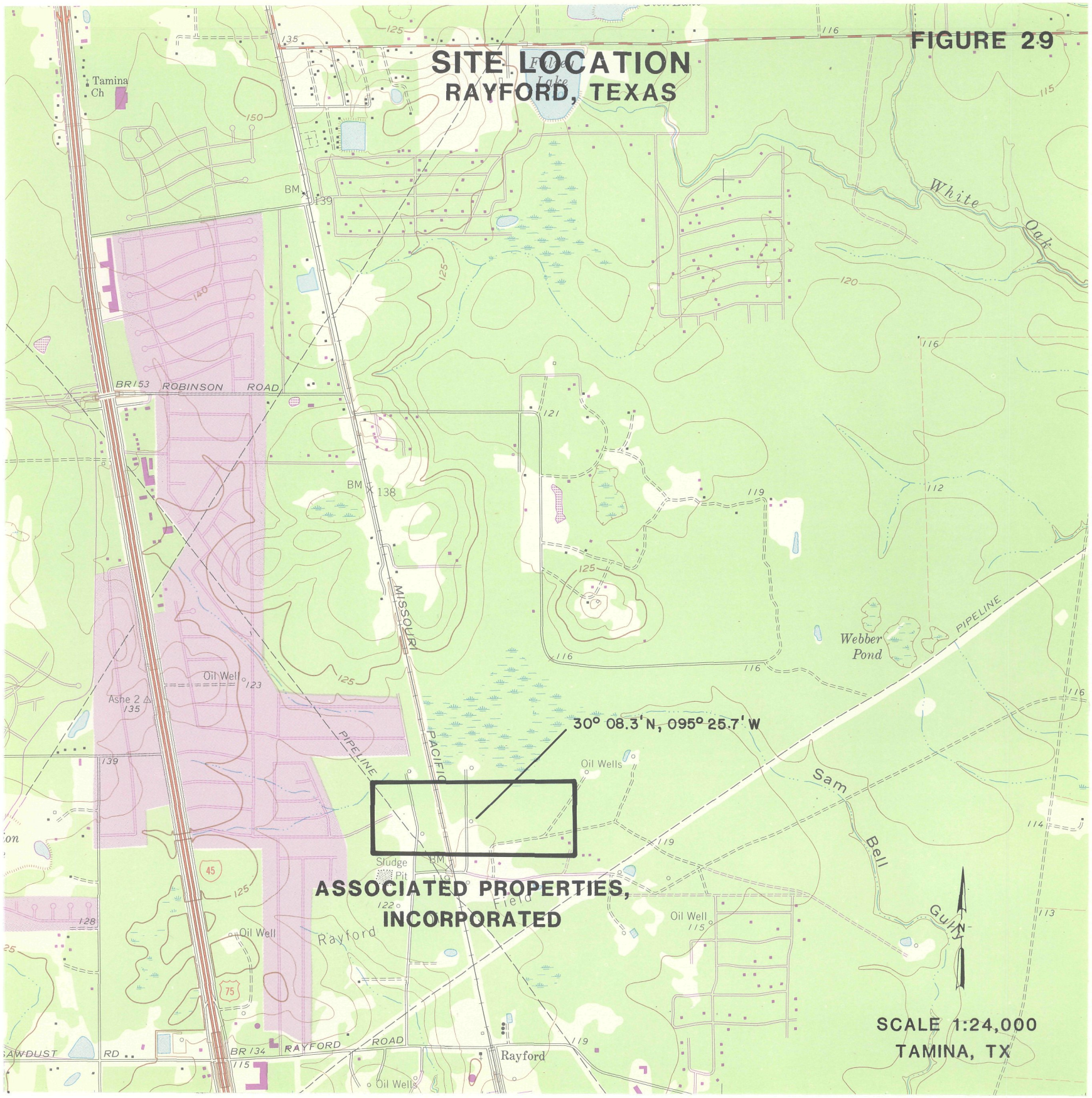


PHOTO ANALYSIS

October 15, 1952, Photograph

No evidence of the Associated Properties, Incorporated, waste disposal site is visible (Figure 30). Two swaths which are reportedly for pipelines (Figure 29) are noted. The study area is heavily wooded, with no surface drainages apparent at this time.

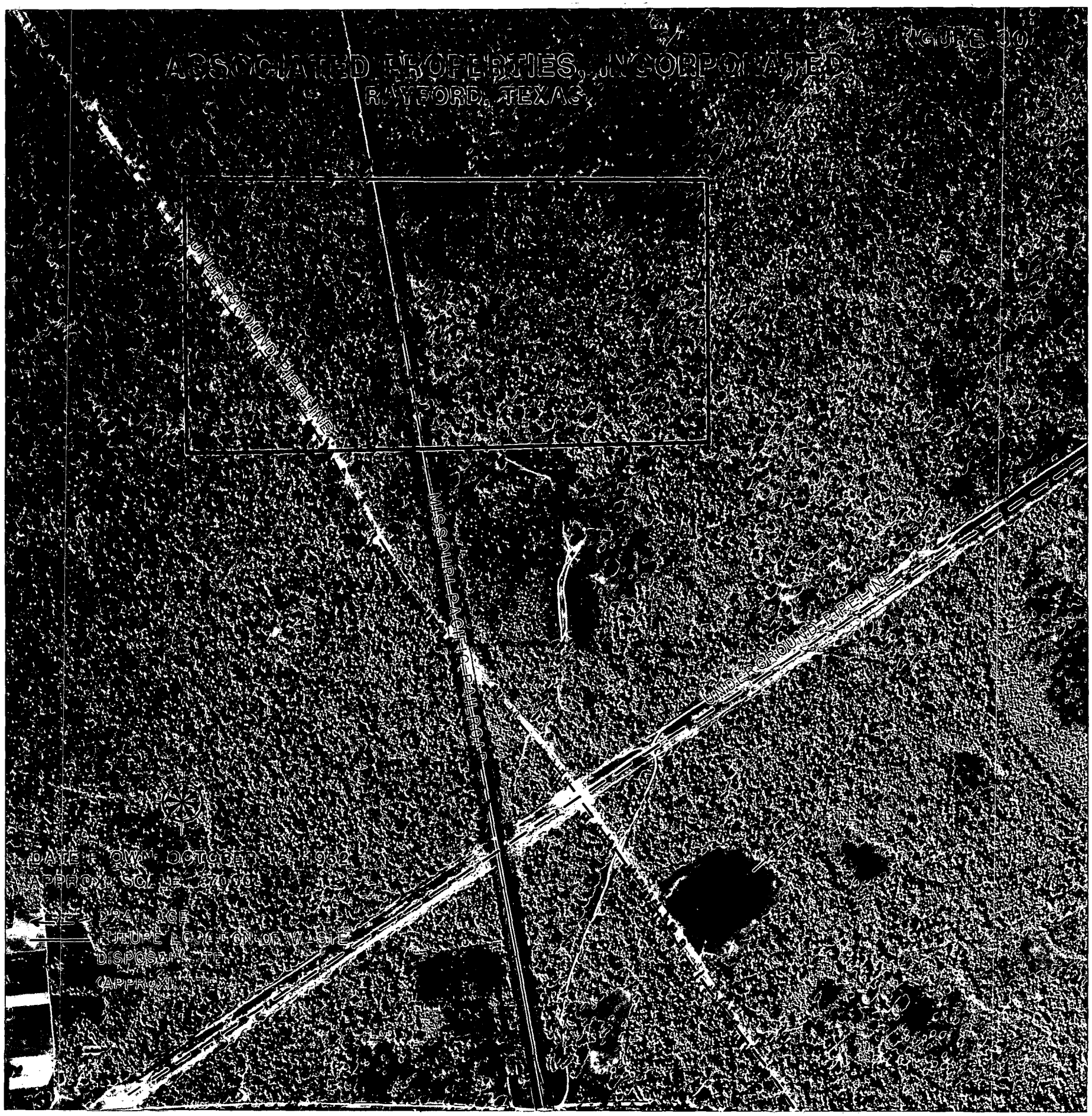

ASSOCIATED PROPERTIES, INCORPORATED
RAYFORD, TEXAS
UNDERGROUND PIPELINE
MISSOURI PACIFIC RAILROAD
UNDERGROUND PIPELINE
DATE FLOWN OCTOBER 15, 1952
APPROX. SCALE 1:7000
PASTURE
FUTURE LOCATION OF WASTE DISPOSAL SITE
APPROX.

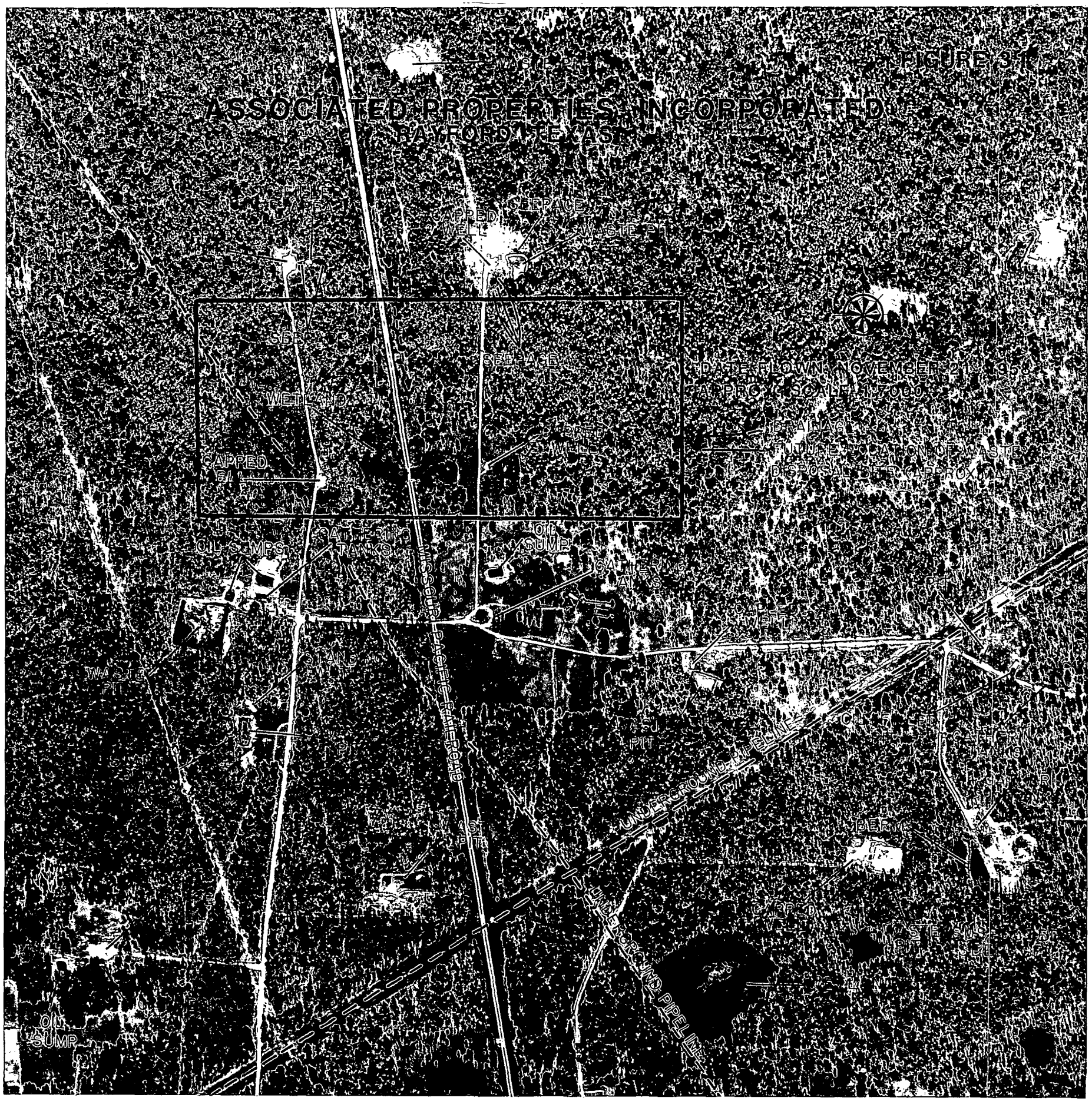
FIGURE 30

November 21, 1958, Photograph

Several capped wells and a waste pit are present within the area which will encompass the Associated Properties site (Figure 31). Seepages are noted near the future site and may threaten a wetland that is adjacent to the Missouri Pacific Railroad tracks. All wells located in that section of the oil field that surrounds the site appear capped. Waste pits, oil sumps, and 10 gathering tanks are present within the oil field. Seepages are noted in several locations. No indication of the future canal project is evident on the photograph.

FIGURE 3-1

ASSOCIATED PROPERTIES, INCORPORATED
RAYFORD, TEXAS



November 20, 1968, Photograph

A canal that was not visible on the 1958 photograph is present within the oil field (Figure 32). A large landfilled area abuts the canal on its southern and western sides. Seepages are visible within the fill material, but none appear to have entered the canal. Additional filled areas border the canal, but an absence of visible seepage precludes a determination as to the possible contents of these areas.

Several waste pits that were noted on the 1958 photograph (Figure 31) are no longer visible within the oil field. The areas in which these waste disposal pits were formerly located have revegetated. Seepages and spillages are visible throughout the oil field. Some of these pose a potential threat to wetland areas.

FIGURE 32

ASSOCIATED PROPERTIES, INCORPORATED
RAYFORD, TEXAS

May 10, 1982, Photograph

Levee walls enclose a ditch that was visible on the 1968 photograph (Figure 33). A second ditch has been constructed to form a perpendicular confluence with the above-mentioned ditch. Excavated soil has been amassed into spoil areas and a landfill that abut the levee walls. Stains are visible upon a berm wall of the new ditch. Absence of seepage that leads away from an adjacent spoil area makes the origin of the stains uncertain.

Tar deposits and a gray milky substance have been disposed of amid the spoil material. Yellow discolorations and black stains noted within the spoil areas are most likely seepages from the tar deposits. An oil production well, associated tanks, and a pipeline are noted near a spoil area. Spill stains are evident at this location.

Outfalls, drain pipes, and other surface drainages are present within the site. Some of the drainage outlets empty into the drainage ditch whereas others flow towards areas south of the ditch. Dead and stressed vegetation is noted in areas adjacent to the ditch as well as in areas farther south.


LIQUID
STAINS ON
SEAWALL
DEAD VEGETATION
TARRY
DEPOSITS
SEEPAGE
TANKS
OUTFALL
FORMER LOCATION
OF OIL STILL
LIQUID
ACCUMULATION
UNDERGROUND
PIPELINE

JOHNSON ACID PITS

ANALYSIS SUMMARY

This site is a former chemical dump located at Highlands, Texas, within the floodplain of the San Jacinto River (Figure 34). Information provided by EPA Region VI states that industrial wastes were dumped at the site in 1951. The disposal area is situated within soil that sinks rapidly and which is subjected to flooding. In 1961 the site was flooded by Hurricane Carla. This flood resulted in a large fish kill within nearby Clear Lake.

A single disposal pit was dug at some time between January 1939 and April 1944 (Figures 35 and 36). The site was expanded by March 1953 (Figure 37) to include seven waste pits and a landfill disposal area. An unidentified substance was visible within the easternmost pits and in soil depressions. Most of the waste pits had disappeared by March 1957 (Figure 38) but the unidentified substance continued to be dumped within the depressed areas. By October 1964 (Figure 39) all wastes pits were gone. Landfilling activity continued to be visible along the eastern edge of the site. Seepage was noted on a photograph that was collected on October 16, 1966 (Figure 40).

At some time between October 1966 and August 1973 (Figure 41) the western half of the Johnson Acid Pits became totally submerged. It is likely that contaminants which may have been present within this section of the site during this period, were washed into the surrounding waters. An aerial photograph that was collected on May 10, 1982 (Figure 42), revealed that the area that formed the eastern half of the Johnson Acid Pits remained above water. At that time the area was being used for the disposal of solid wastes. Flood waters have inundated a large tract of land east of the Johnson Acid Pits, but flood waters have not reached the remaining portion of this site.

FIGURE 34


SITE LOCATION
HIGHLANDS, TEXAS
George White Lake
Bluff
BM 45
ROAD
39
Bird Lake
Park
Library
Highlands
29° 48 6 N, 095° 04 6 W
Cem
BM 37
Slough
Grennel
Clear Lake
JOHNSON ACID PITS
Sewage Disposal
Bear Lake
36
St Jude Ch
Whites Lake
33
BM 35
PIPELINE
Diamond Island
Gilbert Landing
Manvel
Park
Oil Well
BM 17
Lake Sandy
PACIFIC
BM 24
MARKET ST ROAD
N
BM San Jacinto 34
SCALE 1:24,000
HIGHLANDS, TX

PHOTO ANALYSIS

January 30, 1939, Photograph

An area north of Clear Lake has been cleared of its tree cover (Figure 35). Access to this area appears limited, and it is unlikely that it is being used for disposal of waste materials.

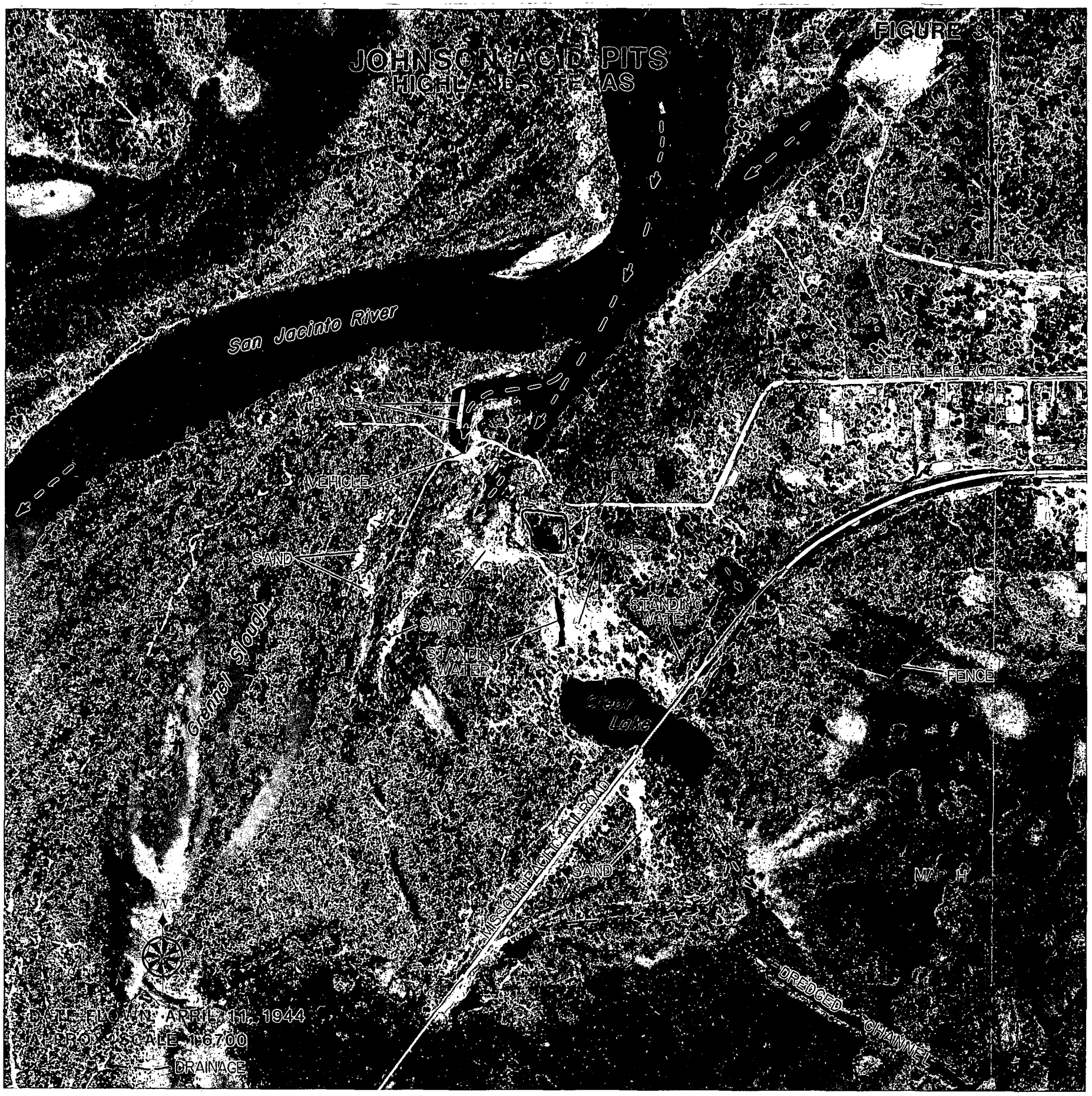

JOHNSON ACID PITS
TEXAS
San Jacinto River
CLEARED AREA
CLEAR LAKE ROAD
MISSOURI PACIFIC RAILROAD
SAND
MARSH
DATE FLOWN JANUARY 30 1939
APPROX. SCALE 1:6700
DRAINAGE

April 11, 1944, Photograph

An unlined, liquid-filled pit is located approximately 188 meters (616 feet) north-northwest of Clear Lake (Figure 36). The pit is situated within a low, flood-prone area, and is accessed via Clear Lake Road which leads westward from Highlands, Texas. The walls of the pit are banked, but no serious effort to construct a protective berm appears to have been made.

Depressions found in the vicinity of the pit have filled with liquid, forming lakes and ponds. This tendency to pond is suggestive of a high water table and poor surface drainage. There is no indication that flood waters and rain have inundated the pit, resulting in the overflow of waste liquids into the surrounding terrain. A vehicle that may be a dump truck, and two barges, are present on the photograph. These conveyances do not appear to be involved with the waste pit.

FIGURE 3


JOHNSON ACID PITS
HIGHLANDS, TEXAS
San Jacinto River
CLEAR LAKE ROAD
BARGE
VEHICLE
WASTE PIT
HOUSES
SAND
SAND
SAND
STANDING WATER
STANDING WATER
FENCE
Grannel Slough
Clear Lake
MISSOURI PACIFIC RAILROAD
SAND
MARSH
DREDGED CHANNEL
DATE FLOWN APRIL 11, 1944
APPROX SCALE 1:6700
DRAINAGE

March 25, 1953, Photograph

A waste pit that was present on the April 11, 1944, photograph is no longer visible (Figure 37). For the most part, the area in which the pit was previously located has revegetated.

A larger waste disposal site has been constructed since the 1944 photograph. It abuts Clear Lake along its northwestern edge and is accessible via roads that lead westward from Highlands, Texas, and eastward from the riverbank. The site consists of seven waste disposal pits (five of which are liquid-filled) and a landfill disposal area.

An unidentified, dark substance that appears similar to that contained within five disposal pits, is noted in several locations within the landfill disposal area. The substance has seeped into the surrounding terrain and may be responsible for the mottled appearance of the landfill material. There are drainages within the site that could allow seepage and surface runoff to flow into Clear Lake and the San Jacinto drainage network.

FIGURE 37


JOHNSON ACID PITS
HIGHLANDS, TEXAS
San Jacinto River
STANDING WATER
PREVIOUS LOCATION OF WASTE PIT
FILLED AREA
STANDING WATER
STANDING WATER
STANDING WATER
SEEPAGE
UNIDENTIFIED SUBSTANCE
LANDFILL
DISPOSAL PITS
POND
UNIDENTIFIED SUBSTANCE
LIQUID-FILL DISPOSAL PITS
VEHICLE
CLEAR LAKE ROAD
SOUTH PACIFIC RAILROAD
VEHICLE
Clear Lake
UNIDENTIFIED SUBSTANCE
STANDING WATER
MARSH
POND
DREDGED CHANNEL
N
ARCH 25, 1953
1:6700
DRAINAGE

March 26, 1957, Photograph

Two of the five liquid-filled disposal pits that were present on the March 1953 photograph are no longer visible (Figure 38). Their former locations have been filled. The three remaining disposal pits have been drained, and moisture stains are in evidence. Two additional disposal pits that were present in the southwest corner of the site have also disappeared. A landfill occupies this portion of the site.

An unidentified substance similar in tone to that visible on the 1953 photograph (Figure 37) has ponded within site depressions. A pond that is located southwest of the disposal area appears to contain some of the unidentified substance. No traces of the foreign substance are visible within Clear Lake or the San Jacinto River.

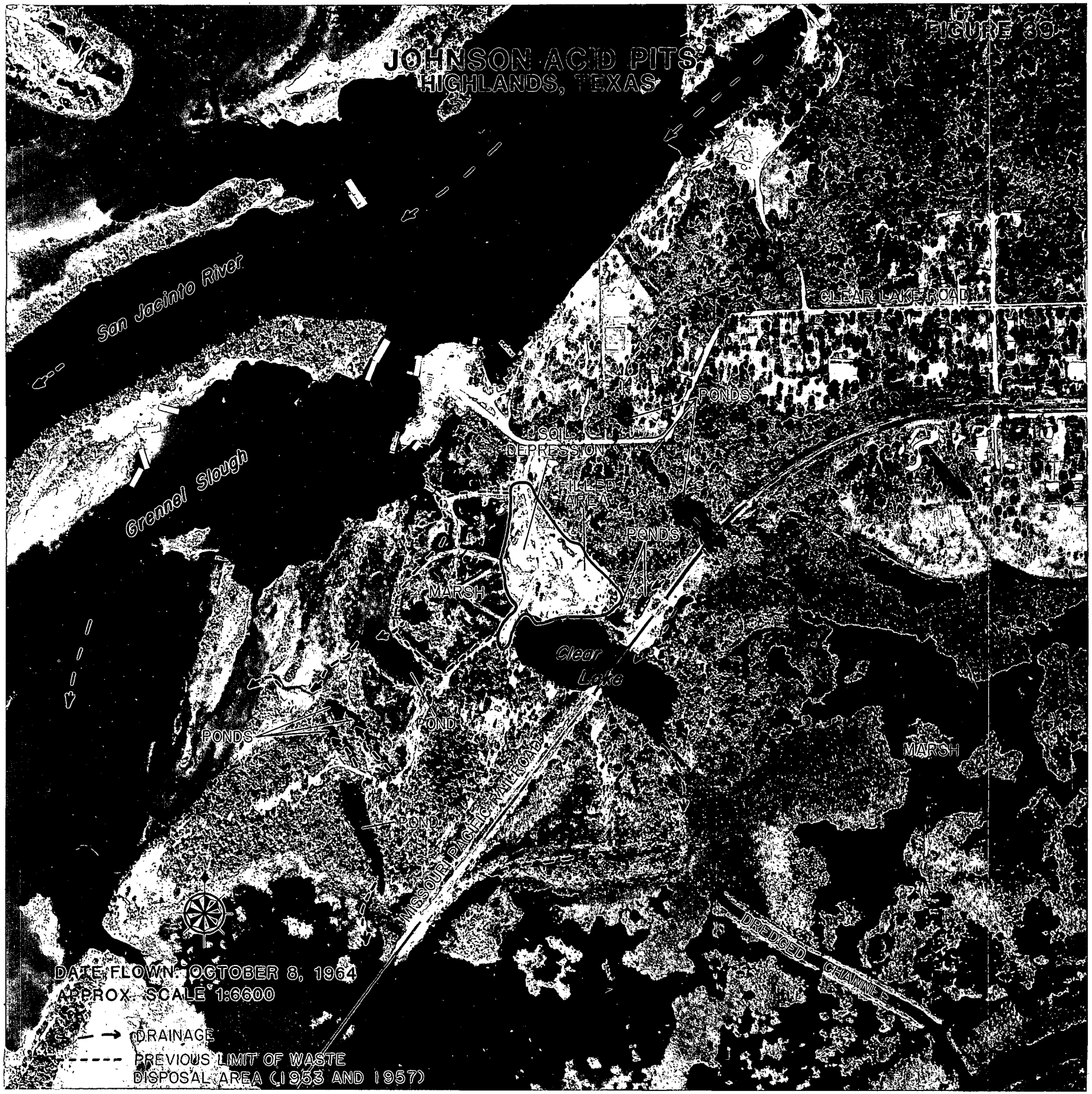

JOHNSON ACID PITS
HIGHLANDS, TEXAS
FIGURE 38
San Jacinto River
CLEAR LAKE ROAD
STANDING WATER
PONDS
UNIDENTIFIED SUBSTANCE
STANDING WATER
Slough
Grennel
LANDFILL
UNIDENTIFIED SUBSTANCE
STAINED PITS
FILLED AREA
UNIDENTIFIED SUBSTANCE
POND
LANDFILL
Clear Lake
MISSOURI PACIFIC RAILROAD
MARSH
POND
DREDGED CHANNEL
N
DATE FLOWN: MARCH 26, 1957
APPROX. SCALE 1:5700
DRAINAGE

October 8, 1964, Photograph

No waste disposal areas are noted within the site (Figure 39). The unidentified substance that was present on the March 1953 and March 1957 photographs (Figures 37 and 38) has also disappeared.

An area near the eastern edge of the site that had encompassed disposal pits during 1953 and 1957 appears to have been filled. Acreage that had previously formed the western half of the waste disposal site (Figures 37 and 38) has become marshland.

FIGURE 39


JOHNSON ACID PITS
HIGHLANDS, TEXAS
San Jacinto River
Grennel Slough
CLEAR LAKE ROAD
PONDS
SOIL DEPRESSION
FILLED AREA
PONDS
MARSH
Clear Lake
POND
PONDS
POND
MISSOURI PACIFIC RAILROAD
MARSH
DREDGED CHANNEL
DATE FLOWN: OCTOBER 8, 1964
APPROX. SCALE 1:6600
DRAINAGE
PREVIOUS LIMIT OF WASTE DISPOSAL AREA (1953 AND 1957)

October 16, 1966, Photograph

The waste disposal area is similar to its appearance on the October 1964 photograph (Figure 40). Filling activity continues to be visible along the eastern edge of the site. Seepage is present within the fill material.

A fenced area has been added to the site. The purpose of this enclosure is not readily apparent. Several stacks of unidentified objects are also present on the photograph.

FIGURE 40


JOHNSON ACID PITS
HIGHLANDS, TEXAS
San Jacinto River
Grennel Slough
CLEAR LAKE ROAD
POND
MISSOURI PACIFIC RAILROAD
UNIDENTIFIED OBJECTS
PONDS
SEEPAGE
FILLED AREA
SEEPAGE
MARSH
UNIDENTIFIED OBJECTS
POND
Clear Lake
FENCED AREA
UNIDENTIFIED OBJECTS
MARSH
DREDGED CHANNEL
DATE FLOWN: OCTOBER 16, 1966
APPROX. SCALE 1:7200
DRAINAGE
PREVIOUS LIMIT OF WASTE DISPOSAL AREA (1953 AND 1957)

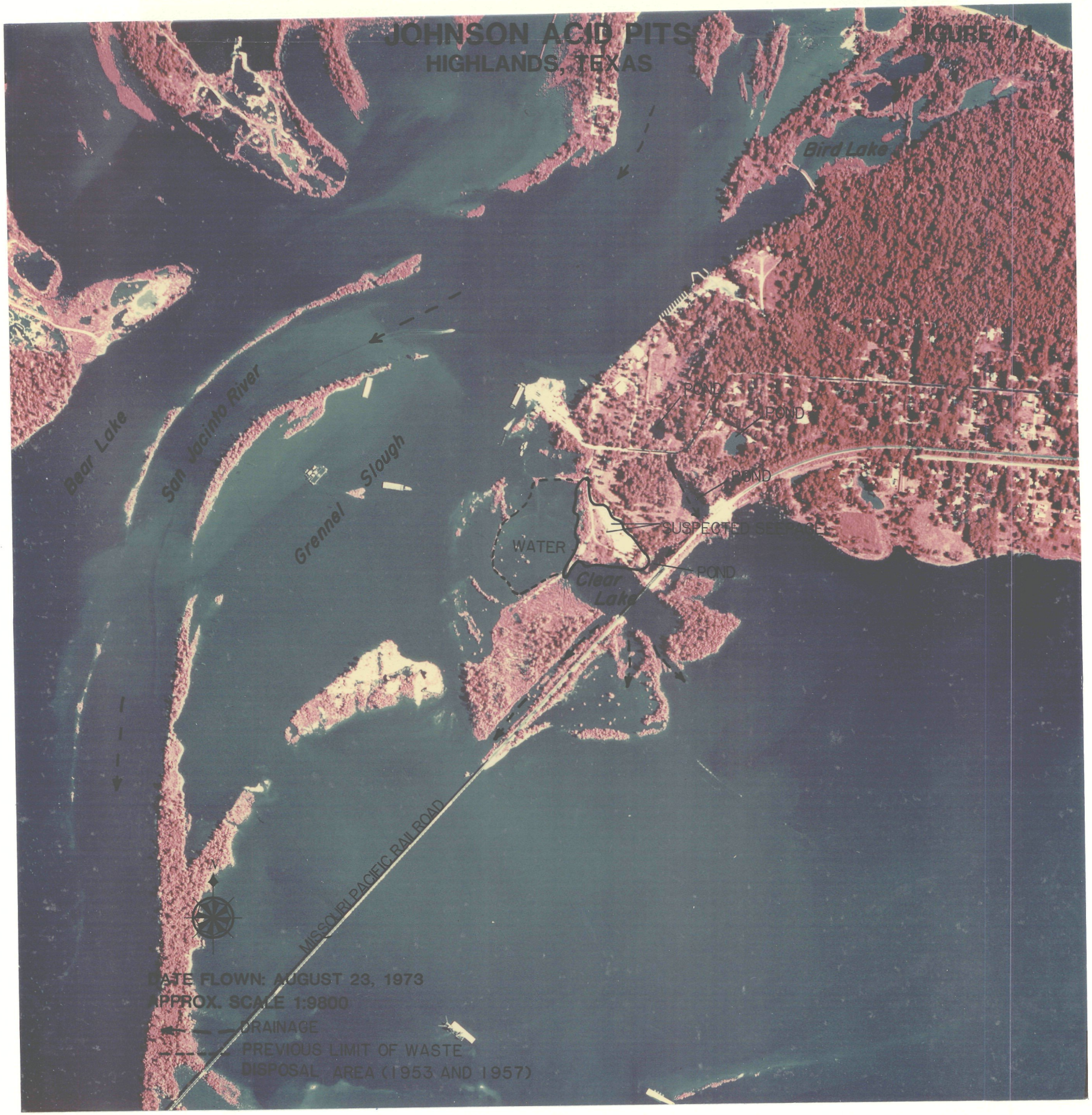
August 23, 1973, Photograph

The enclosed area and unidentified objects that were visible on the 1966 photograph have been removed (Figure 41). Filling activity appears to have ceased within an area that was being filled on the October 1964 and October 1966 photographs (Figures 39 and 40). Stains noted within this area may be due to seepage.

An area that was formerly the western half of the waste disposal site (Figures 37 and 38) is inundated by water. All roads that were present in this area are submerged.

JOHNSON ACID PITS
HIGHLANDS, TEXAS

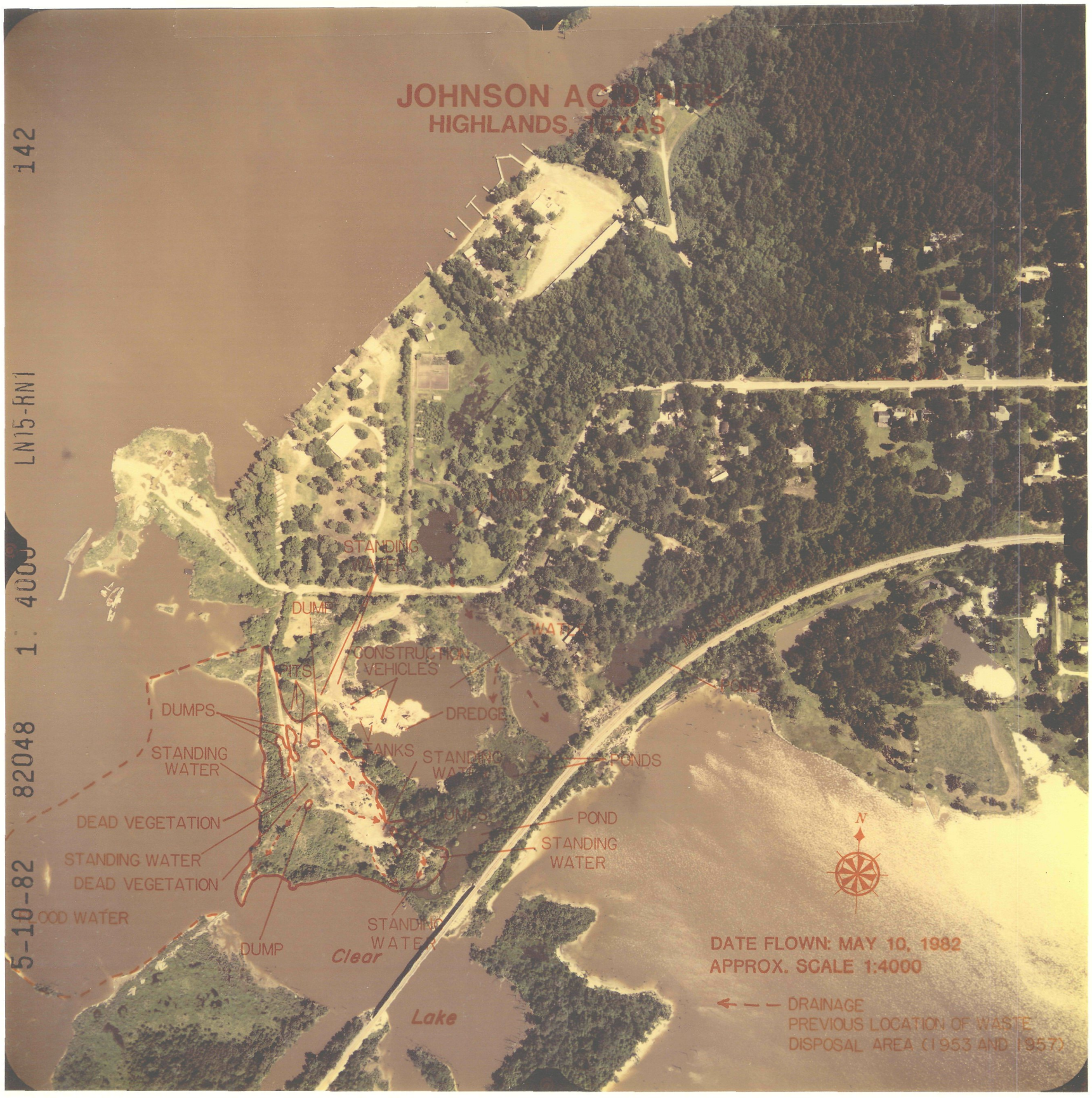
FIGURE 4.1



May 10, 1982, Photograph

Solid wastes and old tree limbs have been dumped within the disposal site (Figure 42). Three shallow pits are also present. Rainwater has collected in several site depressions, creating small ponds. Much of this standing water is highly discolored. There is no indication that the liquid has entered larger bodies of water that abut the site. Some dead vegetation is visible within the site.

An area east of the disposal site is inundated with water. This water has not reached the level of the disposal site. A dredge and several construction vehicles are operating within the flooded area.


JOHNSON ACID PITS
HIGHLANDS, TEXAS
142
LN15-RN1
82048
5-10-82
STANDING WATER
DUMP
CONSTRUCTION VEHICLES
PITS
DUMPS
DREDGE
TANKS
STANDING WATER
PONDS
POND
DEAD VEGETATION
STANDING WATER
DEAD VEGETATION
STANDING WATER
DUMP
Clear Lake
N
DATE FLOWN: MAY 10, 1982
APPROX. SCALE 1:4000
DRAINAGE
PREVIOUS LOCATION OF WASTE DISPOSAL AREA (1953 AND 1957)